MECHANICAL HANDLING

INCORPORATING 'MATERIALS HANDLING'

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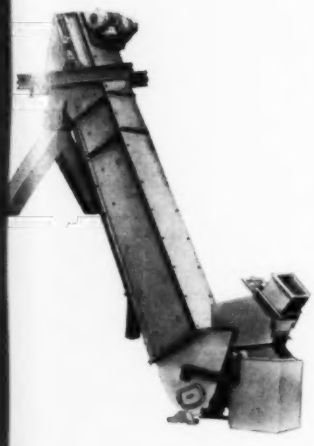

THE INDUSTRIAL FILM

For some years now the film has been established as an essential part in the industrial life of this country. It can be found being used in the field of training, as a means of instruction in service and maintenance, in the design and research department, and in what perhaps is its most common form, as a valuable means of publicity.

Over the last few years the number of industrial films produced has been very considerable and a remarkable increase has been recorded year by year. Many of these have been of a very high quality indeed, some even coming under the classification of brilliant. There have also been many good ones made but it is felt that there have been far too many that can only be placed under the heading of 'indifferent', and in consequence have only created a limited interest and must have failed to 'get over' whatever message the film was intended to convey.

From a preliminary survey the impression gained is that slightly fewer new industrial films were made during last year. If the reduction was in those within the category of indifferent then this is encouraging, because bad films not only serve no useful purpose, but they also tend to discourage audiences from viewing other films of better quality. A good industrial film for whatever purpose it is required need not be complicated, but it must be carefully prepared and produced by people who know their job, in order that it is technically correct and aimed directly at the audience it is intended to interest. Whether the results are good or bad it costs a good deal to produce an industrial film, so it is surely worth while to take sufficient care in the initial planning to ensure that when finished it will fall into a classification above that of 'indifferent'.

Only recently attention was called to a British manufacturer who claims remarkable results from a series of high-quality films which were first started in 1920. Despite the somewhat specialized nature of the product, invited audiences of over 16,000 now view these films each year.

The mechanical handling industry is perhaps one that lends itself particularly well to the application of the industrial film. Manufacturers in the industry have not been slow in taking advantage of this as will be shown in the programme of films that has been arranged in conjunction with the **Mechanical Handling Exhibition,** which takes place from May 3rd to 13th next and is organized by this journal. The programme has been divided into two sections, one covering general films on mechanical handling subjects and the other section dealing with exhibitors' own films, depicting their equipment in use.

Our own film now entitled 'Accent on Mechanical Handling', which covers several of the recent Mechanical Handling exhibitions, has been re-edited and is ready for distribution to interested parties. This film gives an excellent survey of the latest developments in various classes of equipment.

Pour les lecteurs de l'étranger
Für unsere ausländischen Leser
Para los lectores de ultramar

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INHALTSÜBERSICHT AUF DEUTSCH

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Fuel Handling Machinery For Berkeley

MUCH OF THE production capacity of the John Thompson Ordnance Company during the last three years has been absorbed by the making of the fuel handling machinery for Berkeley nuclear power station, now being built for the Central Electricity Generating Board by the A.E.I.-John Thompson Nuclear Energy Co., Ltd. Of this consortium John Thompson, Ltd., is a partner.

Berkeley machinery, for loading and unloading the fuel elements with which the two reactors will be charged, is the first of its kind in the world; since in a commercial nuclear power station these operations must be carried out with the reactors under load conditions.

So that continuous generation of electrical power is assured, exhausted fuel elements must be immediately and safely replaced by new ones; the control equipment must be adaptable for withdrawing for servicing; and an accurate assessment has to be made of the future requirements of the reactors. In addition to being completely heat-resistant and pressure-tight the machinery must withstand gamma-rays, and, of course, it must be immune from neutron activity so as to provide unfailing protection for the charge face operators. The Berkeley fuel handling equipment, charge face machinery, fulfils these and many other essentials.

The choice of materials for making the machinery and

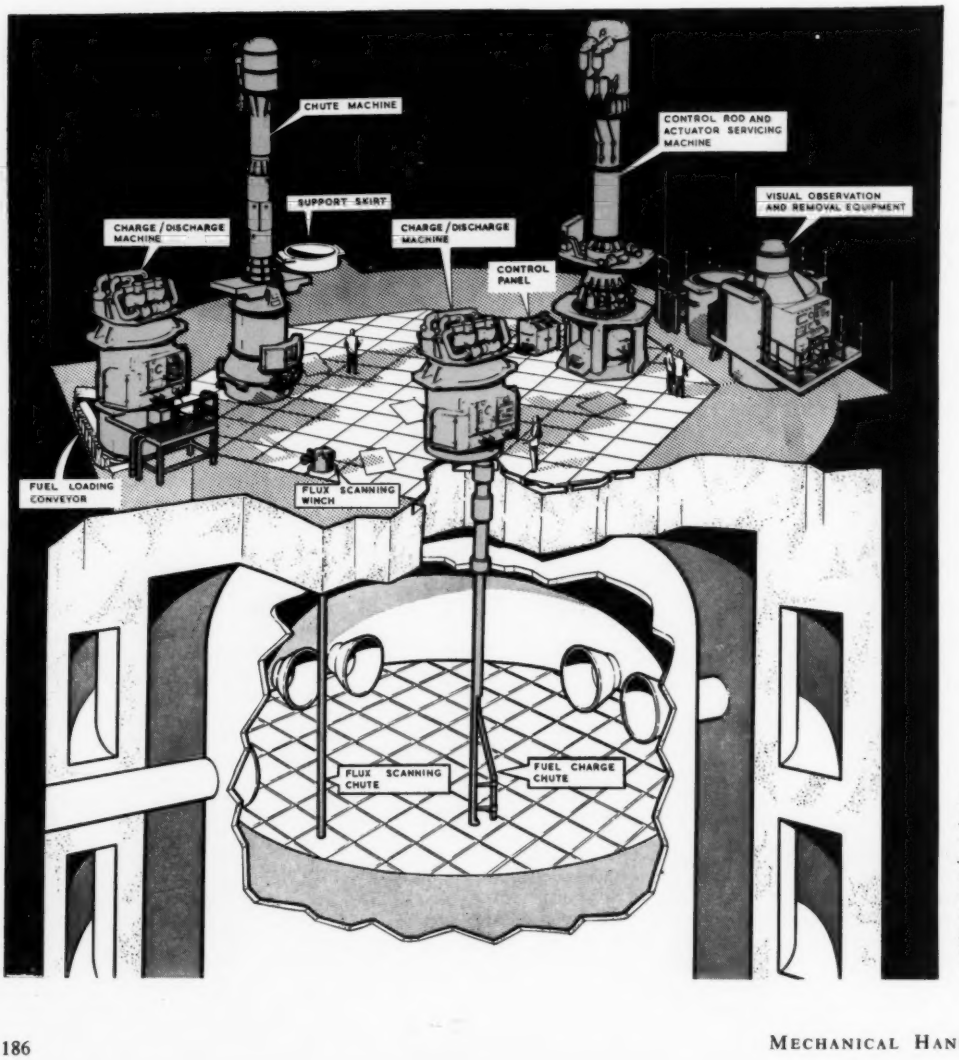


Fig. 1. The charge face floor of one of the two reactors at Berkeley. The fuel handling equipment is shown with flux scanning chute and fuel charge chute in their functional positions, inside a cutaway of the reactor pressure vessel

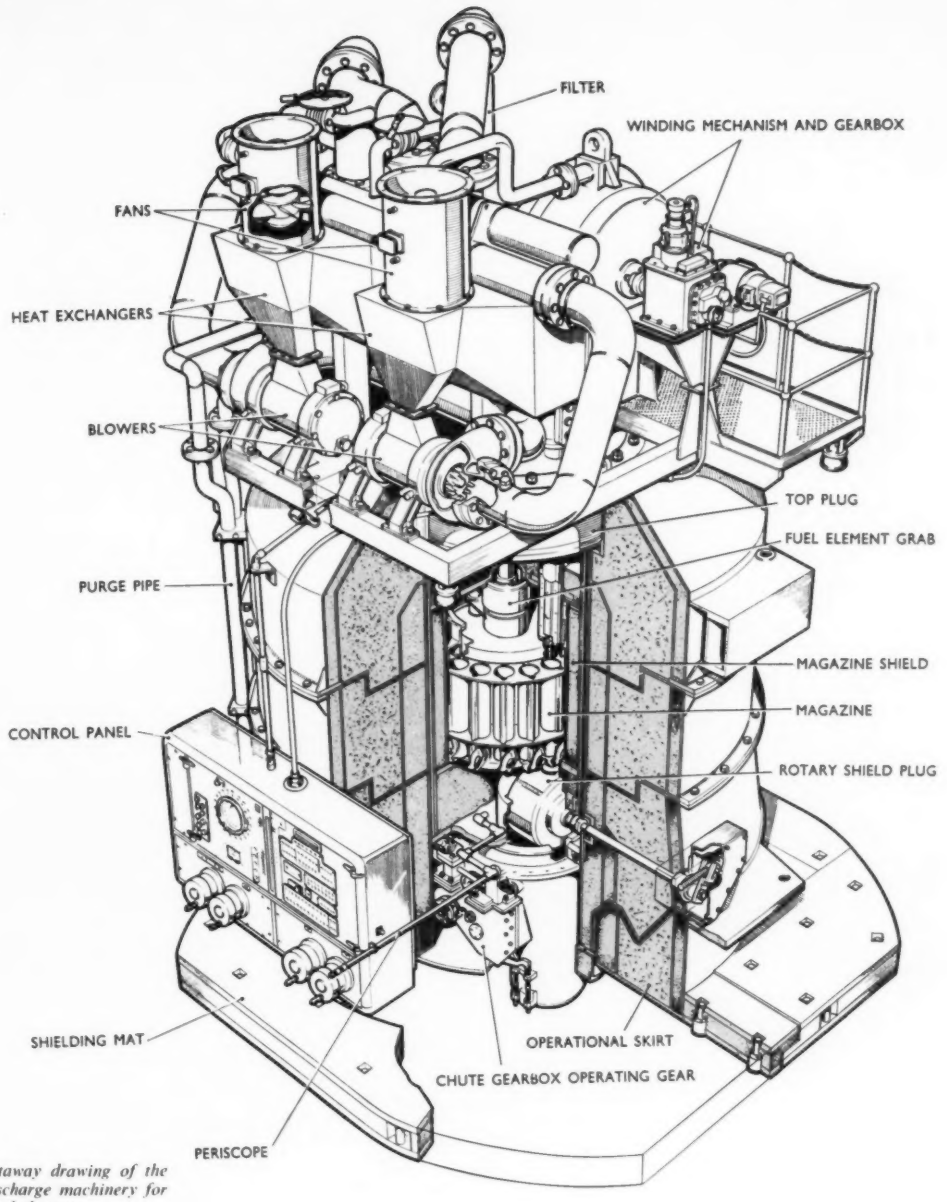


Fig. 2. A cutaway drawing of the charge and discharge machinery for handling the fuel elements

the production methods employed created enormous problems which were surmounted only by extensive research and experiment. All materials must be compatible and in this direction difficulties were encountered with such items as rotating bearings, etc. When welding the assemblies the difference between stainless steel and mild steel in clearances had to be taken into account and the substitution of needle roller bearings is another instance calling for specialized production techniques.

Extraordinary precautions were taken when making the remote handling equipment, since, because of its inaccessibility and its radioactive state after use, it cannot be manually maintained and must, therefore, be completely reliable in operation.

Berkeley charge face machinery mainly comprises charge machine, discharge machine, chute machine, and control rod and actuator servicing machine (crasm). This equipment is briefly described below.

Charge and Discharge Machines

The main constituents of each of these machines, Fig. 2, are fuel element grab, grab winding mechanism, and control switches, winding gearbox assembly, drives to magazine and latch mechanism, chute gearbox and standpipe operating gear, control panel and its mechanism, and circulating and cooling equipment.

The reactor core is made up of 3,000 fuel channels formed in graphite blocks; in each channel 13 fuel elements, resting on a deflector or dummy element and a gag, are fitted. The gag controls the quantity of CO_2 gas under pressure which can pass up a fuel channel, extracting heat from each fuel element as it passes by it. To provide continuity of heat output, the fuel elements, when nearing exhaustion, must be exchanged for new ones and variations in output may necessitate the replacement of the gag by one with a larger or smaller orifice. As the quantity of CO_2 which can pass through the reactor is increased, and as

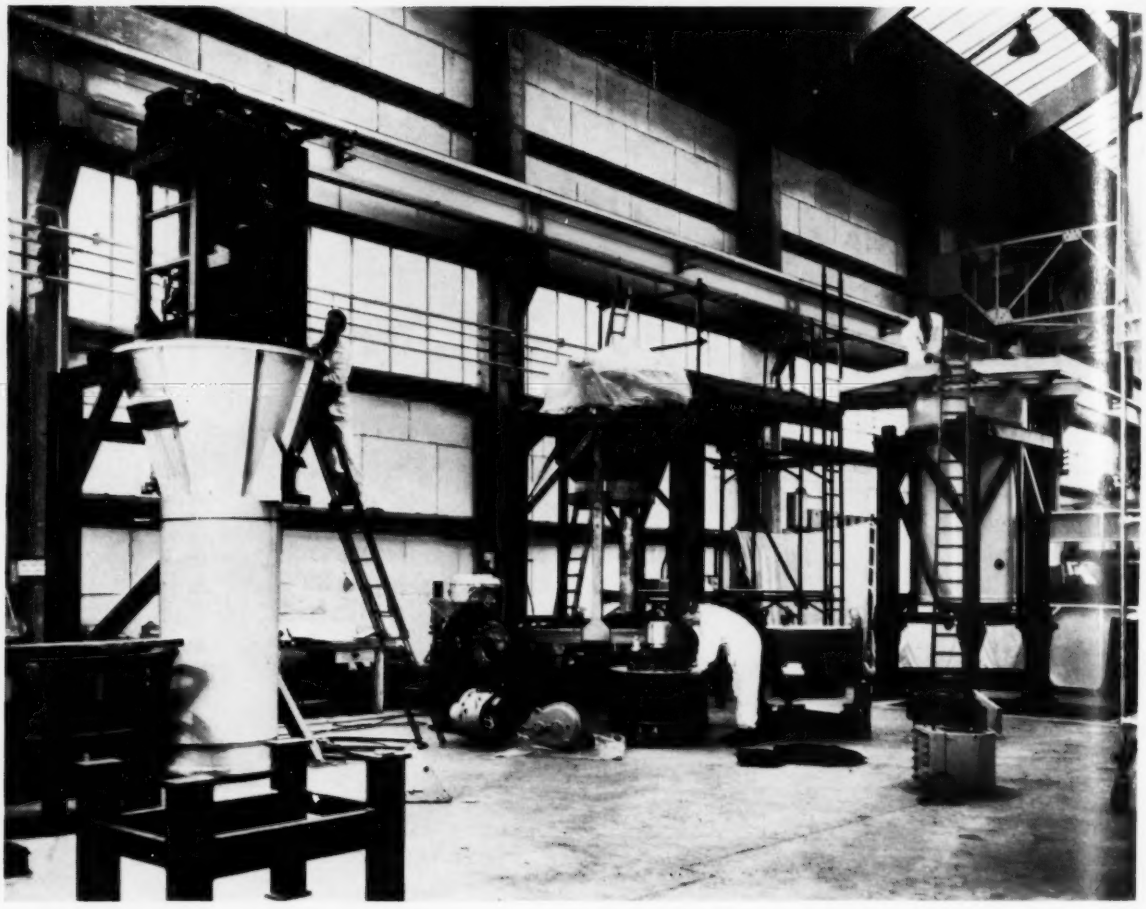


Fig. 3. Earlier stages of production of fuel handling equipment are shown in this picture of John Thompson Ordnance Company's workshops. At left is the top portion of a chute machine with its winding gear and, at centre and right, two charge machines

radiation harmful to human life is given off by the reaction in the reactor, this exchange of fuel elements, etc., must be carried out under working conditions by the machine itself enclosed in a pressure vessel and suitably shielded.

Basically, therefore, the charge/discharge machine performing these functions is a winding mechanism controlling a grab which can engage or disengage from a fuel element, etc., as required. A rotatable magazine is fitted capable of accommodating 13 fuel elements, as also are a reflector, a gag and a spare, and four concrete plugs which seal the chute. Below and above the magazine shield plugs are fitted to reduce the effect of radiation; in the bottom plug is a rotary shield to seal-off the channel used by the grab.

A protrudable unit comprising a gearbox, etc., to connect with and able to control the fuel element chute when it is in the reactor, is positioned at the bottom of the machine. All of this machinery is contained in a pressure vessel, shielded on the outer side to give the necessary protection, and built to withstand the working pressure in the reactor.

For operating the machinery, drives both power and hand, electric indicator wiring, etc., pass through the pressure vessel and shielding to a control panel in which routine operations can be automatically controlled by means of relays, uni-selector switches and a selective card system. A fully comprehensible system of interlocks, both mechanical and electrical, prevent actions which may cause damage or prove dangerous.

The charge/discharge machine can be used to discharge elements from the reactor into its magazine and from there, down the discharge well to the disposal flask. In such circumstances it is a discharge machine internally, it may be highly contaminated and is not normally used for any other purpose. The machine is used as a charging machine when it charges its magazine with new fuel elements from the loading conveyor and afterwards charges, from its magazine, an empty reactor channel.

To operate, a machine must rest on a skirt—the loading conveyor skirt, the discharge well skirt, or an operating skirt. When not operating, the machine rests on a parking skirt. Basically, all skirts are similar, exceptions being in shielding properties and height. The machine, weighing approximately 100 tons, must be lifted by crane from one skirt to another.

A circulating cleansing and cooling system, normally employing air but substituting CO_2 when connected to the reactor, is fitted on the top of a charge/discharge machine. Its fans are powered from trailing cables which also power the machine on a skirt. When the machine is lifted, auxiliary contacts on the crane arms replace power cables to provide power for an adequate cooling supply.

When resting on the operating skirt, the machine is connected to the standpipe valve and has gear fitted by which the valve is opened or closed to allow access to the reactor.

Three machines are fitted with each reactor; the charge and discharge units on the charge face for operational

purposes, and a standby machine, kept in the maintenance workships ready for service when required. Complete, except for the outside shielding, the standby machine is eventually fitted with shielding from the operational machine it replaces on the charge face floor.

Chute Machine

This machine, Fig. 5, is the means by which various chutes can be placed in the reactor to bridge the gap between charge face floor and the reactor pile. The machine includes: charge chute for use with the charge/discharge machine; flux scanning chute used in conjunction with the flux scanning winch; fixed absorber chute used with the crasm machine; thermocouple chute to work with its own winch; vessel; reactor periscope; standby plug which normally closes and shields the bore through the charge standpipe; metal samples handling chute; graphite sample trailing thermocouple chute; and charge standpipe sealing plug.

Two machines are supplied for each reactor charge face, the spare replacement unit not being fitted with shielding. Because the chute machine operates with the reactor 'on load', it includes a pressure vessel which can be connected to the reactor, via the standpipe. The vessel can withstand the reactor pressure. The shielding is fitted to protect the operators from radiation.

The chute machine's equipment comprises: a grab and winding mechanism to raise or lower the chutes; a rotating three-chambered magazine to store two chutes; mechanism to cause the grab to connect with or release its load, and to support a released load in the magazine.

This equipment is contained inside the pressure vessel and on the outside are gearboxes, etc., to operate the equipment and to open or close the standpipe valve. A valve at the foot of the machine is fitted to contain the gas included inside the machine when removed from the standpipe. Facilities are provided for purging and pressurizing the machine.

Outside the main shielding on which the pressure vessel is supported is a control panel for operating the machine. To this panel are brought the drive shafts and electric leads, to cause movements to be made and thus indicate the state of the machine.

Fig. 4. Part of the welding and fabricating bay at John Thompson Ordnance Company's Wolverhampton factory, showing work in progress on equipment for Berkeley nuclear power station

The chute machine is placed by the crane on an operational skirt when working over a charge point, over the inspection well, the discharge well, or the decontamination well. With the exceptions of the high parking skirt and the loading skirt, the machine can be placed on any support skirt. Electrical interlocks prevent lifting until machine and standpipe have been correctly prepared. Interlocks, all of which operate 'fail to safe', also prevent incorrect operation of the machine.

Control Rod and Actuator Servicing Machine

The reactor contains a large number of control rods which can be lowered or raised from the graphite core as part of the reactor control system. Some control rods, called absorbers, are left permanently in place, but the majority are connected by wire cables to the electrical winches.

Such winches, named actuators, are about 15 in dia, 12 ft long, including shielding plug, and weigh 15 cwt. Secured in the biological shield in specially shaped standpipes, the actuators are in the pressure system. Screwed rings by which they are secured are turned by operating a motor and gear ring, known as the actuator clamping machine, which must be attached to the actuator during its removal or replacement in the standpipe.

The machine, Fig. 6, is employed to exchange actuators and control rods, gags, fixed absorbers, etc., in the reactor, with spares. The complete unit comprises a magazine section containing grabs and their widing gear, and a support, or skirt section, complete with various tools by means of which the actuator can be separated from or connected to its control rod. The skirt section is also used with the visual observation and recovery equipment when necessary. Both sections can withstand, either separately or together, the gas pressure in the reactor, and the operations of exchange, etc., can be performed while the reactor is on load. For brevity, the machine is called crasm.

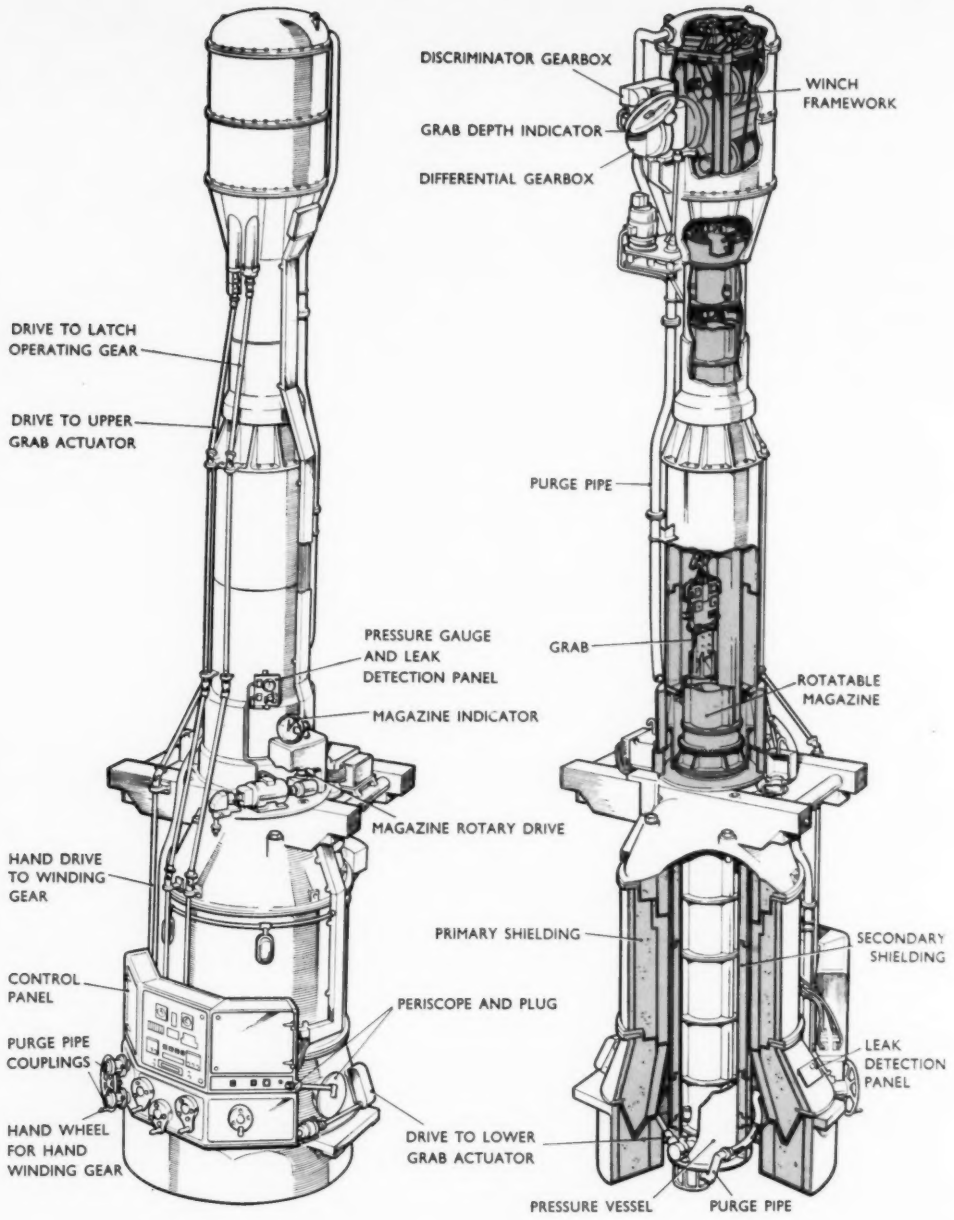
About 40 ft high and 5 ft dia, the magazine section, together with its shielding, weighs 85 tons. It consists of a pressure vessel containing four magazines and associated equipment. Around the pressure vessel is fitted shielding in a structure by which the main crane can lift the complete unit.

A ball bearing of 90 in dia on which the pressure vessel and the major portion of the shielding can be rotated in the vertical plane is situated in the shielding structure.

Four magazines are contained in the pressure vessel: one for a clean, uncontaminated actuator; one for a dirty, radioactive actuator; one for a clean control rod; and one for a dirty control rod. Each magazine contains its appropriate grab which is raised or lowered by an independent set of winding gear. The operating gear for winding gears, for grab operation, for rotating shields in the bottom of the magazine, and for four flat valves which seal the vessel, pass through the vessel and shielding where appropriate. Operating gear is driven by electric motor and gearboxes on the outer surface.

Dimensions of the skirt section and its shielding are, approximately, 10½ ft dia and 8 ft height, and its weight is 65 tons. The pressure vessel has two operating tools: the manipulating tool and the cable recovery tool. The former provides the means whereby the control rod is disconnected from or connected to the cable on the actuator, and the latter supplies a means of recovering the control rod and its cable, should an actuator become defective. To assist in these operations, two periscopes are fitted. A rotary shield and two flap valves seal against radiation and pressure, and a separate sleeve is provided to bridge the gap between the standpipe and the bottom of the skirt.

As a separate unit, the control panel is on a trolley connected by electric cables to the power supply and to



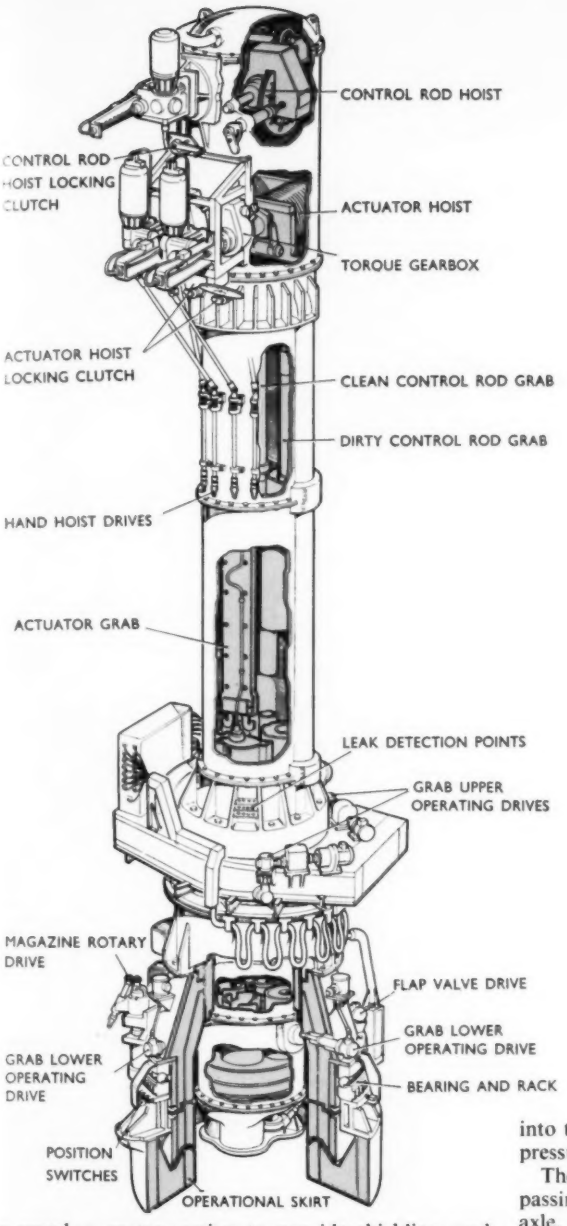
both the magazine and skirt sections. When the visual operation and recovery equipment is in use with the skirt section, the control panel links the skirt and control panel on the recovery equipment.

The skirt, placed by the crane over either an actuator standpipe or a charge standpipe, rests flat on the charge floor plates and the connection to the standpipe is made by the appropriate sleeve. When operations on the reactor are to be carried out the magazine can be placed on a skirt. It is placed on an operational skirt over the inspection well or the chute decontamination hole, for reloading or discharging. It can be positioned on any of the skirts on the charge face floor and electric interlocks prevent either magazine or skirt being lifted unless properly prepared. Similarly, interlocks prevent incorrect operation and are all designed 'fail to safety'.

Control Rod Manipulating Tool

This tool, Fig. 7, fits into the skirt pressure vessel through the lower of the flanged tubes for tools. It is horizontal and can be extended to move into the vertical line of the hoist on the standpipe. It is designed to enable the actuator cable to be disconnected from, or connected to, a control rod under all circumstances. The manipulating tool will support the control rod when these operations are being performed, but cannot release it until the rod is again otherwise supported. When the rod is supported on the tool, turning gear will engage it to turn it to the correct disc or engaging position, and crooked fingers will seize the ball and fitting, either on the cable from the actuator, or from the control rod grab, and move it, thus causing it to disengage from, or engage with, the rod.

Constituting an internal section contained inside the



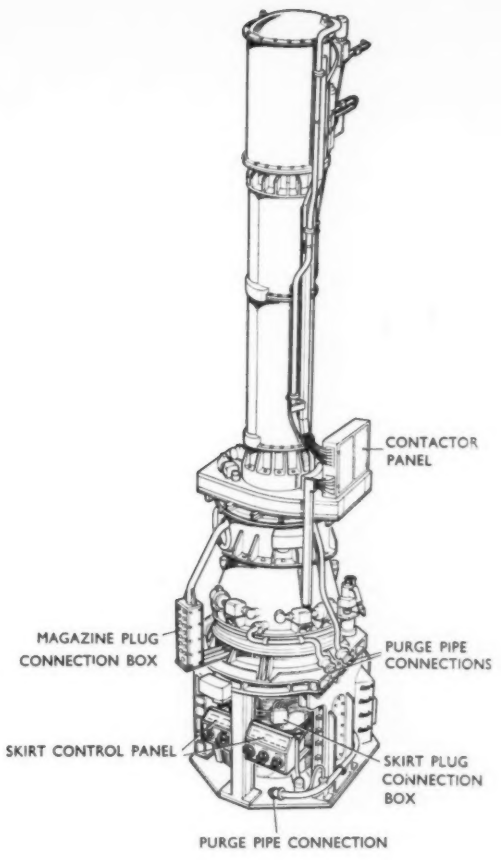


Fig. 5 (opposite page). A cutaway drawing of a chute machine by means of which various chutes can be placed in the reactor to bridge the gap between the charge face floor and the reactor pile

Fig. 6 (above). Cutaway drawings of the control rod and actuator servicing machine (crasm) for the reactor vessels

pressure vessel, a centre section to provide shielding, and an external portion consisting of control panel and gearbox assembly, the manipulating tool is fitted with seven drives passing through its gearbox. Drives are: to extend or retract the carriage of the internal section; to grip or clear the ball socket fitting; to turn the ball socket fitting to the disc or engage position; to seize the cable ball-end; to move the cable ball-end vertically and horizontally to disc, or engage the ball socket fitting; to position the cable cutter; and to cut the cable.

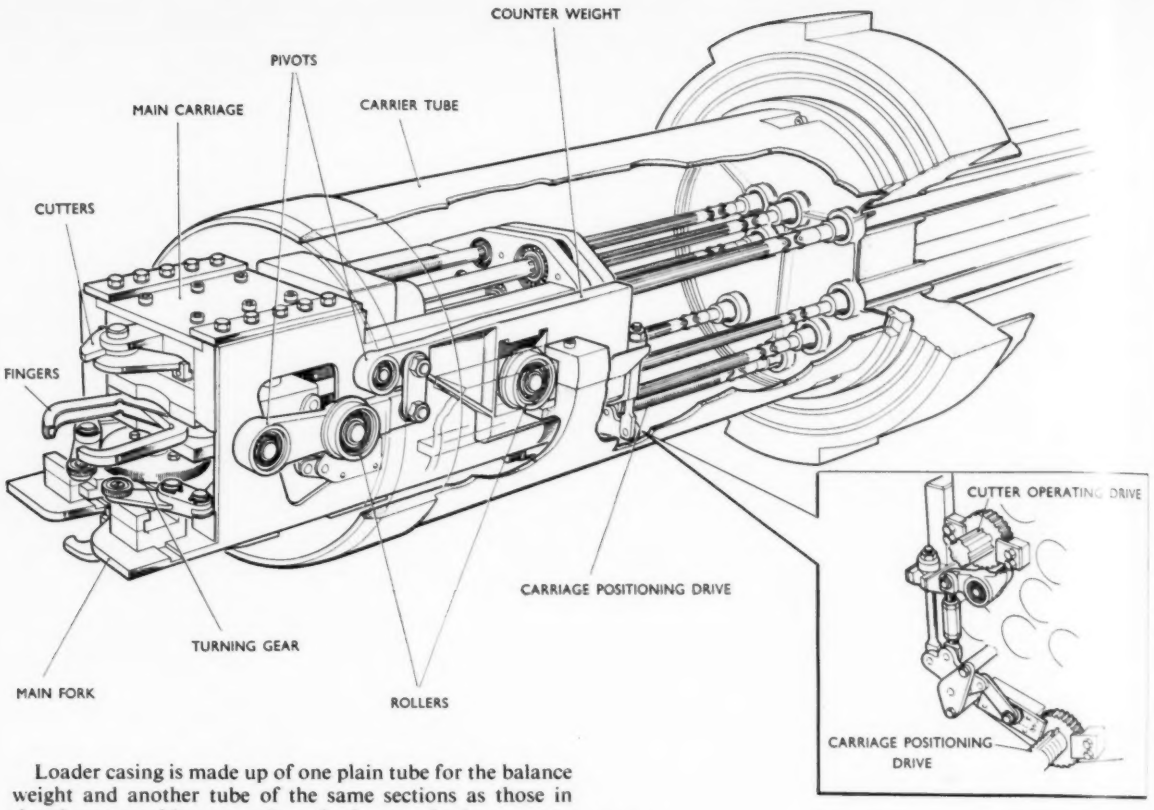
The three interlocks with with the machine is fitted prevent the carriage of the internal section being retracted when it is supporting a control rod; prevent release of the ball socket fitting, unless the main body of the control rod is supported; and prevent the cutting of the cable unless the control rod is supported.

Fuel Element Loader and Conveyor

This equipment, Fig. 8, is used for loading fuel elements into the charge machine and comprises loading skirt, low-pressure coupling, loading conveyor and its loader.

The conveyor consists of two horizontal endless chains passing around four sprocket wheels, each pair on a vertical axle. Supported between the chains are 16 compartments of approximately the same section as the tube used in the charge machine magazine. Stops fitted in the bottom of the compartment hold the fuel element which is lowered into them by the loader, and raised from them by the fuel element grab in the charge machine. The spacing of the compartments is such that they extend over half of the conveyor only: when the first is under the skirt, the other is under the loader. Five spacers are fitted in the blank portion of the conveyor to maintain the correct spacing between the two chains. A motor and gearbox, mounted on the charge face wall, drives the conveyor.

Basically, the conveyor loader is a roller chain passing over a single sprocket wheel. In one end of the chain is a carrier and hook and, in the other, a cylindrical balance weight. A handle turns the sprocket wheel via a spring-loaded clutch which prevents overload. To prevent the element, under its own weight, falling into the conveyor, this spring also loads a brake.

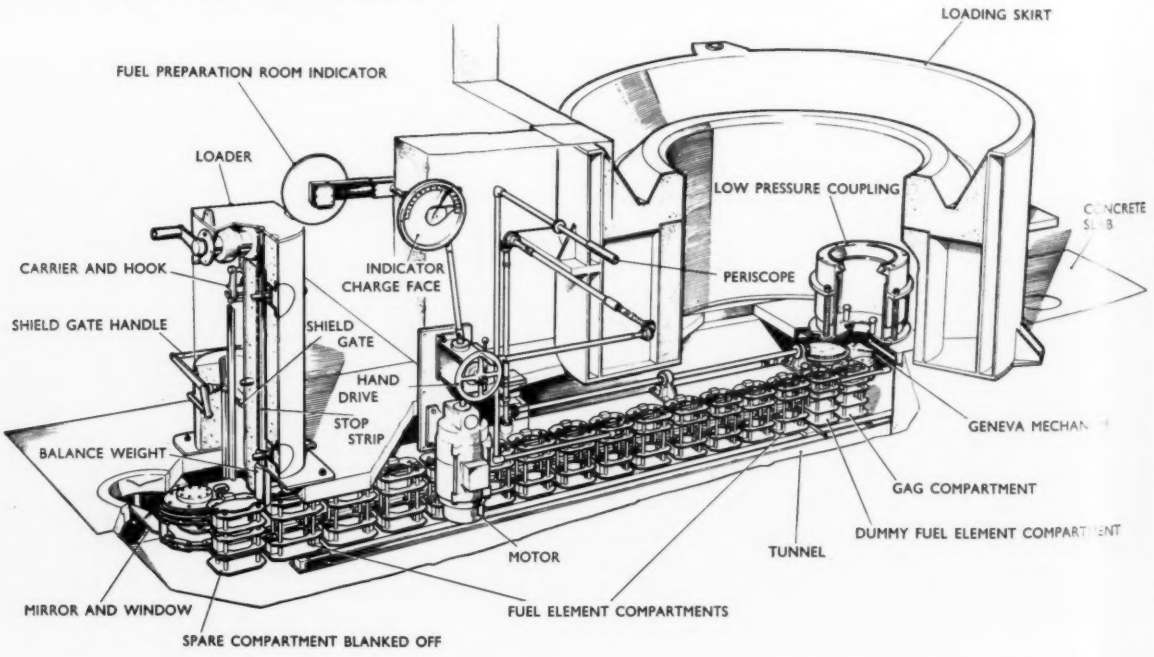


Loader casing is made up of one plain tube for the balance weight and another tube of the same sections as those in the charge machine magazine; the latter tube is cut away to allow a fuel element to be inserted. Two flat plates fill in the sides of the casing which is surrounded by iron shot concrete shielding in a steel retaining shell.

The accuracy with which the charge face machinery is made is illustrated by the services it must perform. Charge chutes, for instance, when selecting from a possible 3,000 fuel channels a single one, for re-charging, does so from a distance of 40 ft and to within 0·22 of an inch.

ABOVE
Fig. 7. The control rod manipulating tool, which was designed and made to work with the control rod and actuator servicing machine. To each of the two reactors there is one such machine

BELOW
Fig. 8. A fuel element loader and conveyor for one of the two reactors



SKIP HOIST APPLICATION TO AUTOMATIC PROCESS PLANT

by O. Winfield, M.I.Plant*

The skip hoist is a fundamentally intermittent process type of equipment in that it takes a load or batch of material and transports it direct to a higher discharge position, the skip returning in semi-automatic operations to base for a further charge. It is indeed a most useful and efficient machine in the bulk handling of material and it can be arranged vertically or in an inclined plane.

On occasions, however, it is required for the material to be not discharged at a single receiving point only, such as into a hopper, but to be conveyed to various successive or alternative positions along the top level. A typical instance of this is in the serving of a series of storage bunkers.

One method would be to have a belt or other suitable type of conveyor running along the top of the bunker range and being served at the tail end by the skip hoist. This, however, has disadvantages, firstly in the need for transfer of the bulk load from one point of operation to another and, so far as a belt conveyor is concerned, representing difficult and far from ideal feeding circumstances. It is true that the feed to the conveyor can be 'regularized' by providing a receiving hopper with a vibratory or other type of feeder to the belt, but this involves additional and varying equipment and also requires more height, which is often not available except by reducing the required storage capacity. Again, if a belt conveyor is used, the most direct method of discharging at the various positions along its length is by the use of ploughs. Ploughing material off a belt is always a messy business and never 100 per cent efficient, and in the case of automatic plant creates unnecessary complications and sometimes none-too-reliable provisions in the electrical control gear.

By adapting the skip hoist principle in one machine for the complete operation, these and many other anomalies are eradicated and this is achieved by extending the skip track over and along the bunker range. It then remains only for the skip itself to be provided with a bottom opening in the form of a radial door so that instead of the usual tipping action, the material can be emptied directly downwards with the skip stopped over any of the discharging stations as required. For want of a better word we call this form of skip hoist adapation a travelling skip as a distinction from the ordinary skip hoist unit (Figs. 1 and 2).

*Chief Engineer, Mechanical Equipments, Ltd. (Part of the Wheway, Watson & McLean Group of Companies).

Fig. 1. A semi-automatic travelling skip installation handling granular refractory material

Fig. 2. View at feed end with skip part-way up the inclined track from the loading point

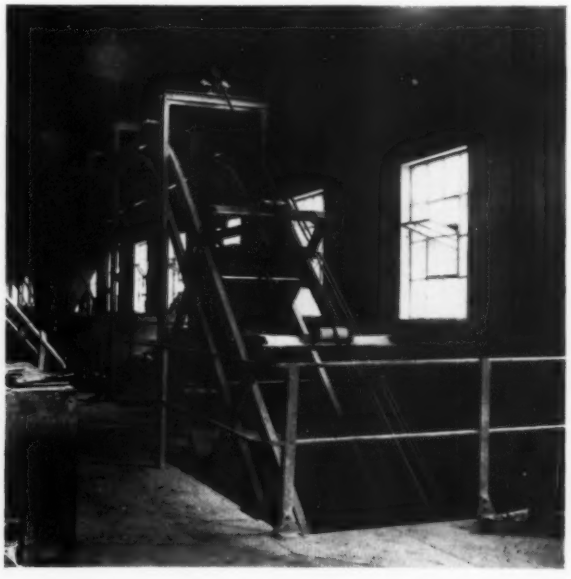


Fig. 3. Bottom loading position of an automatic travelling skip showing the self-operating door in the fully open position, with the skip at rest

For the travelling skip to function within a fully automatic continuous process plant, several special features must be considered. Firstly, we must have provision made for accepting a continuous automatically controlled feed to the machine and this can be achieved, as with fully automatic skip hoists, by at least two methods:

(1) A cut-off door, hinged at the bottom, is fitted to the outlet of a receiving hopper being fed by conveyor or other primary feeder with the raw material. This door is held closed at the top by 'dogs' or similar latch arrangement having a toggle bar which is tripped by the skip itself on passing the door before coming to rest, in the downward travel, to its bottom loading position. Alternatively, the door can be opened electrically by a separate contact or operated simultaneously with the bottom limit switch action, i.e. the stopping of the skip. In the case of the mechanical action the released door, resting against the edge of the the skip, will be supported as it opens until it finally rests in the required position acting as a chute for the material to run out of the hopper into the skip. This is illustrated in Fig. 3.

On the loaded skip commencing its upward journey at the end of the predetermined time pause it pushes the door upwards and closes it, leaving it held in position by the dog latches. Fig. 4 illustrates a typical example, showing the loaded skip on its upward travel after closing the door. In this instance two different materials are being proportionately fed by conveyor into the receiving hopper serving the skip.

(2) With an exactly determined rate of feed by the conveyor serving the skip, the electrical contacts can be arranged so that immediately the bottom limit cuts the current out, with the skip in its loading position, the conveyor is simultaneously switched on and then switched off again with the re-starting of the skip. This method dispenses with the need for a receiving hopper but it is often difficult to avoid a certain amount of spillage. Also, it will readily be seen that method No. 1 represents a saving in time for the complete cycle of operations since the charge for the skip is accumulating during one journey and is ready for immediate discharge, requiring a few seconds only, for the next journey on the return of the skip.

With any travelling skip machine, whether fully automatic or not, it is necessary for means to be provided to allow the skip to stop at or to pass a particular discharge station as desired and this is normally done by catchgear arrangement which operates a hinged section in the track. In its simplest form the required track section can be manipulated into the correct position by handchain or lever arm. In the case of electrically operated catchgear, which is of course necessary with automatic control, the hinged track section is pulled into position by the energizing of solenoids or thrustors, the section having a balance weight to cause it to drop back into the normal 'free' position on breaking the current or de-energizing.

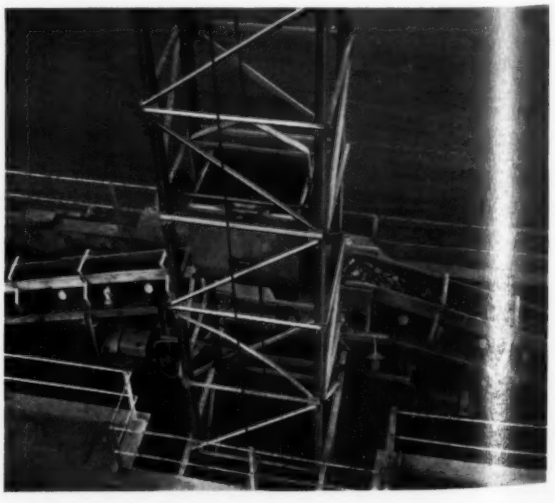
The position into which the section is moved by this action causes the radial door of the moving skip to be arrested against a stop or peg on the door and the forward travel of the skip opens the door to allow discharge of the material. The combined positioning of the limit switch at the station concerned causes it to be tripped by the skip only when this has happened and as it reaches the fully open position of the door. The usual electrical control then operates in that, by means of a reversing contactor after a suitable time pause for discharge, the skip commences its return journey allowing the door to swing into its closed position again. At the same time the solenoids are de-energized and the track section swings back into position, which until again actuated, will allow the skip to pass straight through to a further station on other journeys according to the operating cycle.

The most interesting feature of this type of operation and control is that an almost unlimited variation of sequences can be obtained as desired. In other words, according to the arrangement of the electrical contact system within the control panel, the loaded skip can be made to call at stations successively or in any order required and also for any number of consecutive visits to any one station. The advantage of this feature can be appreciated in the description of the scheme illustrated in Fig. 5 given later.

Often in an overall plant scheme, the use of storage bunkers at one stage constitutes a break in the continuity of control, but this need not necessarily apply. It is possible, by combined control of that part of the plant following from the bunkers together with the service system just described, to obtain a completely automatic plant working on a fixed overall cycle without interruption at any stage. This is where the travelling skip system can be said to be applied fully to a completely continuous process, and typical of this operation is the following example.

Fig. 5 shows an arrangement of part of an ingot mould furnace plant working on a fully automatic basis to operate within a fixed burning cycle. The section dealt with is that handling coke which is supplied to the siding by railway

Fig. 4. Ascending skip with load. The receiving hopper door, which has been closed by the passing skip can be seen at the bottom



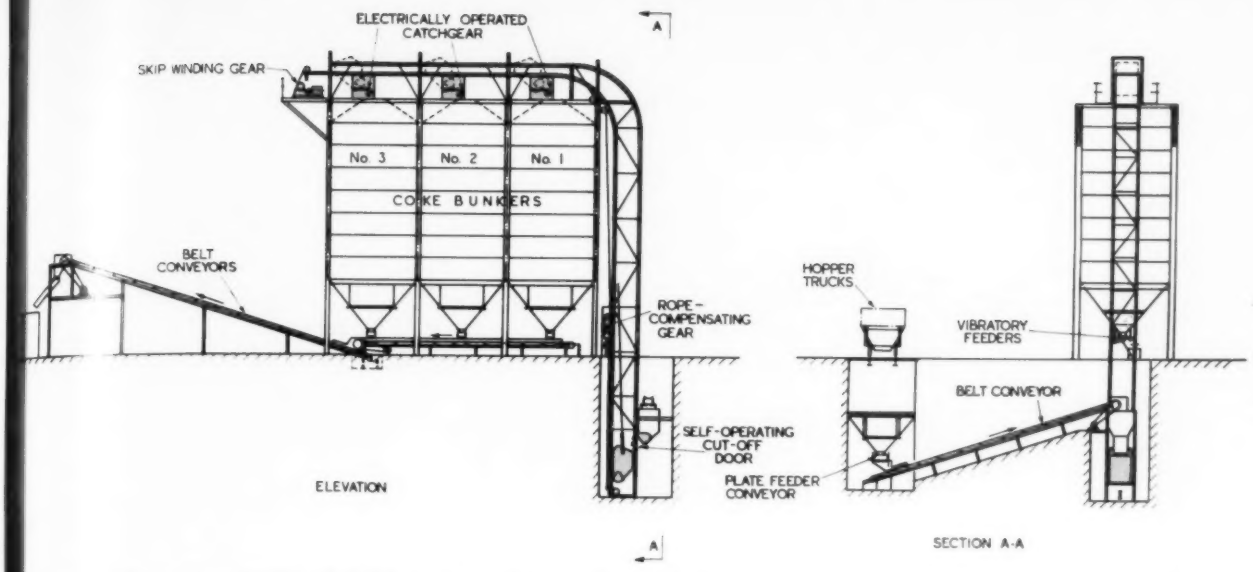


Fig. 5. Travelling skip arrangement for handling coke at an ingot mould furnace plant

hopper trucks. From the ground hopper served by the trucks, a plate feeder conveyor succeeded by a belt conveyor serves the travelling skip in the manner previously outlined, continuity of feed being obtained by a suitable supply of standing trucks at the siding.

The feeder and conveyor operate continuously at a slow rate of feed which is at least sufficient to provide a charge equivalent to a skip load for the period of time taken by the skip for its journey to and return from the farthest station, i.e. the longest trip possible to No. 3 bunker. The hopper at the skip loading position in this instance functions merely as a surge hopper.

The skip calls at the three bunker discharge stations in turn, commencing with No. 1. This being the shortest total distance travelled for any one trip, the time pause for loading at the bottom is of the longest duration. The loading period is arranged to decrease proportionately with the successively longer journeys to stations 2 and 3 so that the total time cycle and the loaded capacity of the skip for all three bunker stations remain constant.

At each of the outlets of the three bunkers an electric vibratory feeder serves a common belt conveyor which is continued in an inclined conveyor finally to serve the material to, in this case, a batch weigh hopper. The control to the vibratory feeders is arranged for each to operate in turn for a set period and thereby serve the bunkers equally.

The weigh hopper travels to the receiving position at the conveyor discharge head at regular intervals within the set period of automatic control of the furnace charging machine. Thus, having collected its initial load of scrap metal at another part of the plant, its arrival at this position brings an electrical contact into operation, starting the conveyor and one or other of the feeders at the bunker outlets. On the required and pre-set weight of coke being reached, a corresponding contact on the weigh dial of the car cuts off the current controlling the feed and simultaneously starts other processes which will allow continuation of the machinery in the charging, burning and recharging cycle. These considerations are not for our present concern but are mentioned in order to give a comprehensive picture of the complete automatic process within which the travelling skip plant forms part. It is necessary only for the rate of feed of the conveying plant from the bunkers to be such as will serve the fixed weight required within the time allowed for the pause period of the weigh hopper at this stage since, as previously mentioned, the material is delivered only from the bunkers when called for on the actual arrival of the weigh hopper.

A plant of this nature will naturally be controlled remotely from one central control panel, which preferably will have a mimic diagram forming the background and it follows that, in addition to the visual signal indicating the operations at all stages, there will also be a warning system to safeguard the likelihood of breakdown due to a fault or hold-up of some operation in the process.

So far as the travelling skip and its ancillary plant are concerned, it is obvious that continuity of operation depends in the main on a sufficient supply of material being available to maintain adequate storage in the bunkers. For this, we must rely on the timely supply of truck loads at the siding receiving station and furthermore, it is equally necessary to ensure that for any reason the bunkers are not overfilled.

In the scheme illustrated therefore, top and bottom level indicators are inserted in each of the three bunkers and these are interconnected with the electrical control equipment so that in the event of the material reaching any one of the top indicators, that station will be cut out and the skip will continue to operate on the other two stations only. A suitable visual or audible signal on this occurrence would also serve to keep the operator at the control panel informed of what was happening. Similarly on the possible occasion of a second bunker being full, the skip would serve the one remaining station only. In the event of all three bunkers reaching maximum capacity, the travelling skip and its preceding plant would cut out until such time as the process after the bunkers has reduced the level sufficiently to allow charging to continue.

The relative position of the bottom bin level indicators is such as to give timely warning well before the bunker concerned can actually be empty and in this case an audible or visual signal to the operator is essential for him to investigate the cause of delay in the supply of material at the source.

In conclusion, with the present-day advances in process control and automation, it can be seen that skip hoist operation in the form of the travelling skip has a most useful part to play in the handling of bulk material and the author's Company is experiencing an increasing demand for this class of handling equipment.

MECHANIZATION AT A NEW DISTILLERY

by C. E. Parnall, Technical Editor

ESTABLISHED over a century the House of James Burrough, Ltd., has now achieved a world-wide reputation for the distillation of high-quality gin, marketed under the trade name 'Beefeater'.

In order to meet a remarkable increase in the demand for their product, especially from overseas, it became necessary about two years ago to seek new premises to replace their existing distillery and to accommodate a warehouse and bottling department. This was solved by the acquisition of an industrial building near to their existing distillery in the Lambeth district of London. The building forms a triangle on plan, the west wing being on five floors. The total floor area of the building is in the order of 82,000 sq. ft.

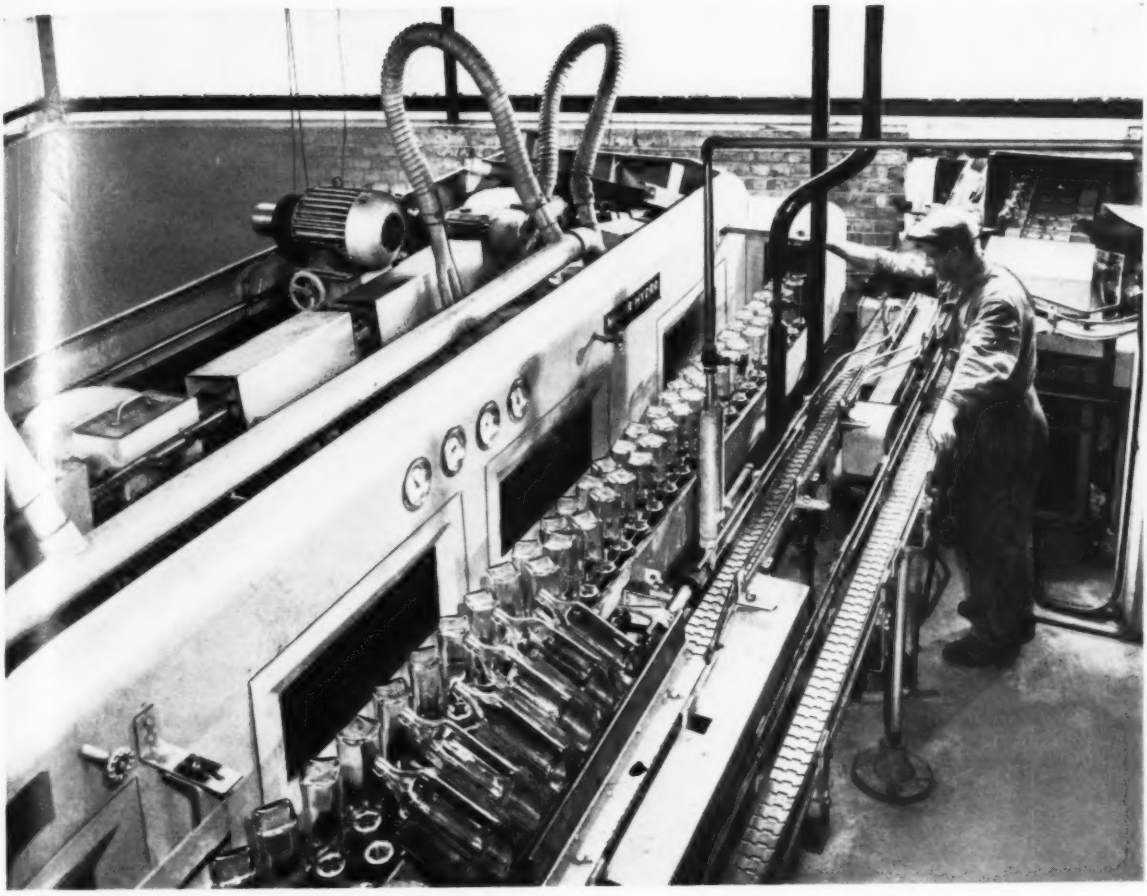
The south end of the west wing was converted into the rectifying premises with a still-room on the second and third floors, blending on the first floor, receipt and despatch on the ground floor with storage in the basement. The north end required little structural alteration for use as bond and duty-paid despatch on the ground floor, bonded case storage on the first and second floors and additional bonded stores on the top two floors.

The north side of the triangle comprises ground, first and second floors and has been adapted for bottling and case storage. The south wing also on three floors is used for general storage and bottle washing. A total storage area for 25,000 cartons is provided.

At a final cost of probably not less than half a million pounds including plant and equipment the new distillery has three stills of 2,000 gallons total capacity, two of 500 and two of 600 gallons capacity. Eventually a range of 12 stills will provide an output three times greater than the maximum from the old distillery.

Out of the total floor area of the new building about 17,500 sq. ft. are mainly occupied by the still-house and boiler-house, another 29,000 sq. ft. accommodate the bonded warehouse and provision has been made for expansion on

Fig. 1. Feeding bottles to washer. Empty cartons are directed to stores by belt conveyor left



ABOVE
Fig. 2. Washed and dried bottles approaching the slat conveyor for delivery to the star wheels and two-wide bottle elevator top right

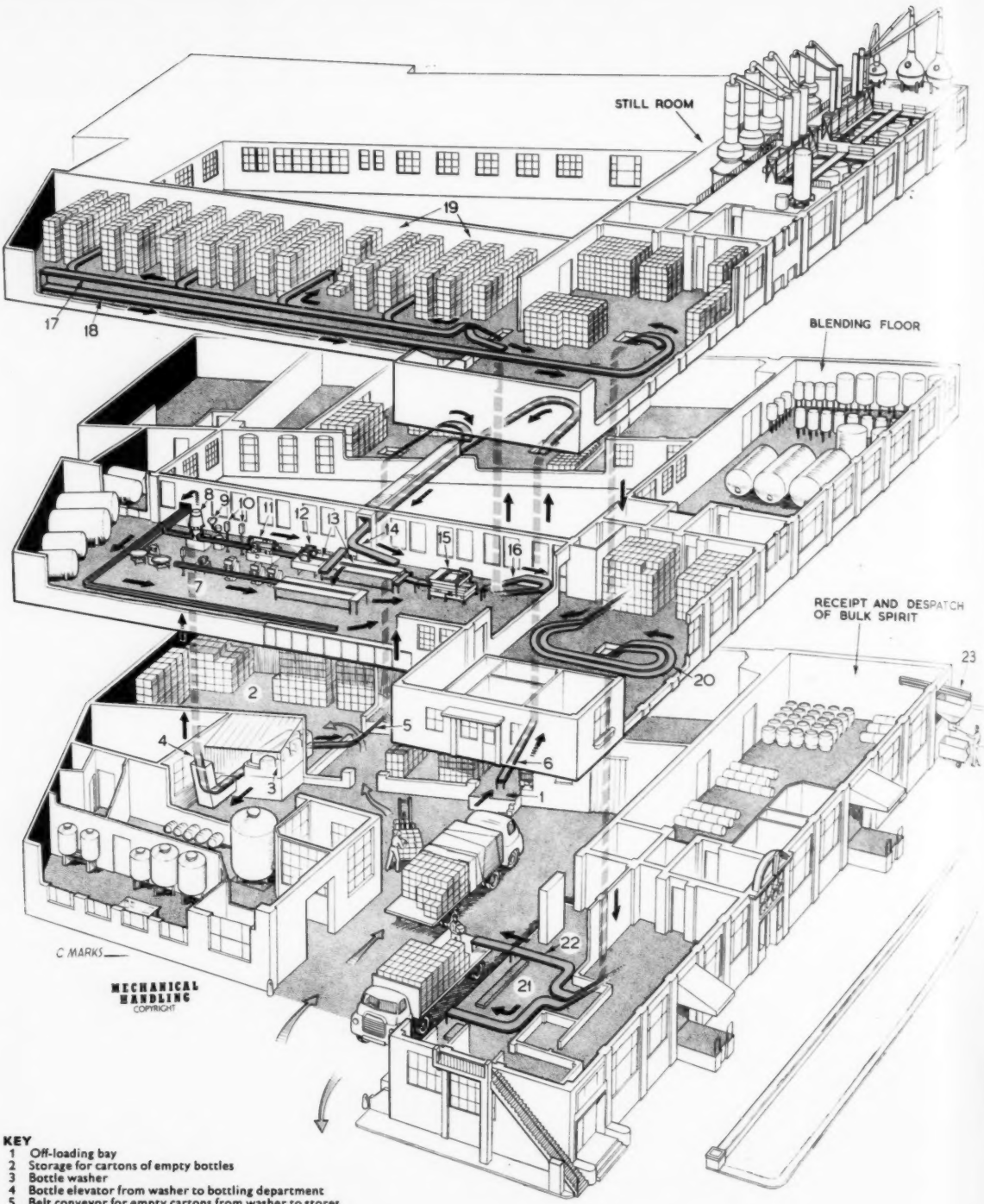
BELOW
Fig. 3. Storage tanks for supplying bottling department

adjoining land giving an extra 26,000 sq. ft. of floor space.

The production schedule provides for a potential output of 10,000 gallons per day together with de-ionization plant to deal with 7,000 gallons of water a day. A reinforced concrete tank of 27,000-gallons capacity has been built on the roof of the building for the storage of cooling water to supply the condensers by gravity feed.

Nearly all the mechanical handling equipment installed is associated with the bottling department and warehouses. Most of the bottles are received into the warehouse already packed in corrugated cartons, each carton containing 12 26-ounce bottles. The cartons are off-loaded from lorries by fork lift truck and transported to a small storage area adjoining the bottle-washing machine. The bottles are removed from the cartons by hand and placed into the washer, the empty cartons being taken away by a belt conveyor up to a first floor storage area where they remain until required or go direct to the bottling department. There is also a second conveyor system into this area direct from an off-loading bay for cases and cartons that are received empty.

The Miller-Hydro Ph402 machine which is used for bottle washing has a capacity of from 200 to 300 dozen bottles per hour. It is arranged for hand loading and automatic discharge, and the machine will handle all shapes and sizes of bottles. Washing takes place in three stages, pre-rinse, first detergent wash, second detergent wash and hot, clean water rinse. This is followed by a four-minute drying period. Washing and rinsing is carried out with the bottles positively geared to the jets and the bottles are



KEY

1 Off-loading bay
2 Storage for cartons of empty bottles
3 Bottle washer
4 Bottle elevator from washer to bottling department
5 Belt conveyor for empty cartons from washer to stores
6 Conveyor to empty carton stores
7 Bottling department
8 Filler
9 Capper
10 'Sighting' inspection
11 Bottle labelling
12 U.S. tax stamp labeller
13 Wrapping bench
14 Empty carton conveyor from stores
15 Sealing and labelling cartons
16 Conveyor to main stores
17 High-level conveyor for 'off-loading'
18 Outgoing belt conveyor at low level
19 Main stores for packed cartons and cases
20 Twin slat conveyors and roller trains down to loading banks
21 Loading-out banks
22 Telescopic roller conveyors
23 Overhead travelling hopper for trash

Fig. 4. Artist's impression of James Burrough's new distillery

handled throughout the washing sequence in polythene holders inserted into malleable iron cups.

The bottles move continuously through the washing and drying stages and all bottles receive 3,720 gallons of detergent and water pumped in and around them at 18 lb/sq. in. during the washing process. Hot filtered air is blown in and around the bottles at 2,000 cu. ft./min at 240 deg F, in order to assure a dry bottle and correct proof of the gin.

After washing and drying the bottles are fed automatically by slat conveyors and star-wheels into a double-sided two-wide straight-line bottle elevator. The automatic star-wheel in-feed units are provided with a hinge spring-loaded guide rail and safety cut-out micro-switch to stop the machine in the event of a bottle jamming. Normal operation speed is in the region of 300 dozen bottles per hour, but the drive is fitted with a variable speed unit to give a considerable range for future requirements. The drive motor is fitted with an electro-mechanical brake to avoid damage by over-running should the machine be stopped suddenly.

The bottle elevator travels from the washing machine up to first-floor level across a small enclosed gantry which spans a yard and into the bottling department where it automatically discharges and transfers the bottles to the bottling lines by means of slat conveyors and driven turntables.

There are three bottling lines in the bottling department, one being fully automatic with an output of 300 dozen bottles an hour, and the other two semi-automatic with an output of 75 dozen an hour. On the fully automatic line bottles are delivered to an Albro CT 15 head, all stainless-steel filler fed from storage tanks at the end of the bottling department. The machine receives empty bottles from a conveyor and as they pass round the filler, gin is filled into them to a uniform and accurate level, so that on being ejected back on to the conveyor every bottle is filled uniformly. The principle of filling is under a very low vacuum so that gin is brought without undue disturbance into the bottle from a tank in the centre of the machine. An important feature is that should a bottle with a chipped neck enter the filler it will be automatically ejected.

After filling, the bottles are capped by a metal closure A.C. capping machine which is followed by the manual operation of 'sighting' or scrutinizing each bottle to detect any possible imperfection before the bottles are fed to a labelling machine.

The Purdy Linamatic Labeller is a straight-through type machine which has a built-in variable speed drive so that the output can be varied from 150 dozen bottles up to 300 dozen per hour. Once the bottles are conveyed from the discharge of the capper to the in-feed of the labeller they pass through a special safety spacer mechanism of the labeller which is so designed that should a bottle become jammed between the points of the star and the conveyor guide rail the spacer mechanism will automatically reset itself and allow the bottle to go through at the correct timing. The bottle arriving from the in-feed space is halted and brought into correct alignment by registers shaped to suit its particular contour and spring-loaded to provide a safety measure against oversize or misshapen bottles. While thus held by the registers it is gripped firmly at the top and bottom and its step-by-step progression through the machine begins.

Three consecutive steps are taken by the bottle between the label application and wiping processes, so that when it arrives at the wiping station sufficient time has elapsed to develop its correct adhesion condition. At the wiping station each bottle undergoes three separate wiping actions graduated so that the wiping pressure is advanced progressively outwards from the middle labels, in order to prevent the trapping of air pockets and to give the final pressure at the extreme edges where it is most required.

Bottles that are destined for the American market need the application of a U.S. Tax stamp over their caps. For this purpose a Svenska labelling machine has been installed so that bottles needing tax stamps are diverted from the discharge conveyor of the labeller into the Svenska machine. The single line of diverted bottles is split into two lines as it enters the machine so that the bottles move along side by side and each bottle is labelled by stations situated on either side of the machine. This has the advantage that the machine itself is only working on half the number of revolutions that would otherwise be necessary if just a single label application head was used. Once the bottles have been split into the two lines they are spaced and timed

Fig. 5. The bottle labelling machine. The 'sighting' operation is taking place, top left

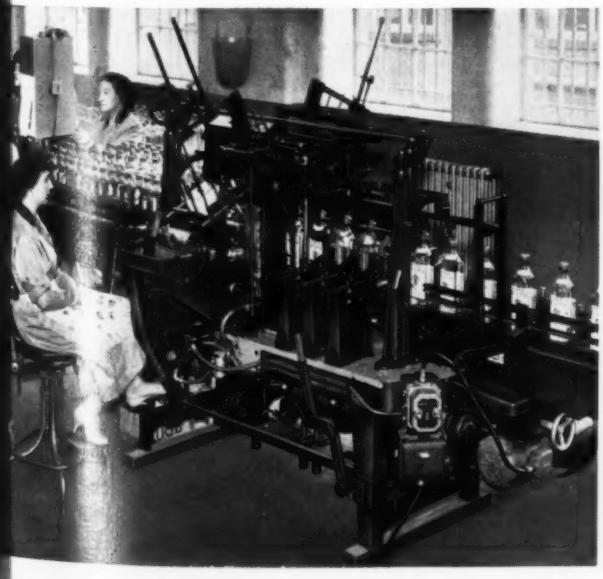


Fig. 6. The end of the fully automatic bottling line with gluing and taping machine for cartons in foreground

to coincide with the labelling attachments.

After labelling and stamping the bottles are wrapped in Cellophane and at this point the empty cardboard cartons are fed down a roller conveyor from the empty case storage department where they have been stored, following receipt from the washer or the off-loading bay. The cartons are placed on roller benches on either side of the main bottling conveyor and loaded by hand with 12 full bottles. The filled cartons are then rolled by hand into a gluing and taping machine. From this machine the sealed cartons leave on a conveyor to the storage bays on the floor above, each carton being counted automatically by a P12C electronic counter. This counter is fully transistorized and is provided with an indicator light fitted remotely from the counter unit which remains alight until either the light source bulb fails or the current to the counter fails. Provision has also been made for an extra relay to break the conveyor motor contactor switch so that the conveyor stops should any of these breakdowns occur.

Full cartons are taken from the bottling lines by means of belt and wood slat conveyors up to the larger main storage area on the second floor. A wood slat conveyor which traverses the length of the main second floor storage area is mounted at a high level and is fitted with a traversing plough which enables cartons to be diverted to storage at any point along its length. Directly below the slat conveyor is a very long belt conveyor which is for outgoing full cases and cartons from the stores. A portable roller bend can be fitted at any position along its length to feed the cases and cartons.

From the main second floor stores outgoing cases and cartons are lowered through other storage areas to the first and ground floors by twin slat conveyors and roller trains to loading banks for despatch. Telescopic roller conveyors extending on to the lorry platform are provided on the loading out bank.

All the belt conveyors used in this installation are of sheet metal construction with ball-bearing roller tracks and return idlers. Belts on the inclined machines are of the grip-faced rubber-surfaced type and on the horizontal machines of solid woven cotton. Wood slat conveyors are of the double roller chain type, the chains being provided with welded attachments on every link to which the hard wood slats are bolted. All belt and slat conveyors are driven by totally enclosed geared electric motors and chain drives which are fitted with safety shear pin devices where necessary and control is by direct-on type push-button starters.

Fig. 8. Twin slat conveyors between floors for outgoing cartons and cases

Before gin can be transferred from the still-house to the storage tanks in the bottling department it has to be weighed and the 'draw-back' assessed by Customs and Excise. The gin is therefore pumped from the still-house into a prodorglas weigh tank of 4,000 gallons capacity which is mounted on a 20-ton scale. This scale is the largest of several used throughout the distillery, and consists of a 6-ft 6-in square universal movement platform mounted at ground level. It has a no-loose-weight type steel yard graduated by four pound divisions.

Among the contractors concerned with the construction of James Burrough's new distillery and of interest to readers of this article are the following: *architects*, Douglas J. D. Wood, F.F.A.R.I.B.A.; *consulting engineers*, Laithwaite and Bak; *main contractors*, Marshall Andrew & Co., Ltd.; *lifts*, Titan Lift Co.; *conveyors*, Hugh Campbell (London), Ltd.; *bottle washer*, British Miller Hydro, Ltd.; *tanks*, Prodorite, Ltd.; *fillers*, Albro Fillers, Ltd.; *labellers*, Purdy Machinery Co.; *photo-electric counter*, Electronic Machine Co.; *carton gluing and taping machine*, Fredk. Lane, Ltd.; *weighing machines*, Vandome & Hart, Ltd.; *fork lift truck*, Lansing Bagnall, Ltd.

Fig. 7. Portable roller bend in main stores for feeding outgoing belt conveyor

Fig. 9. Overhead travelling hopper for disposal of trash

HANDLING WITH INDUSTRIAL TRUCKS

PART 7—TRUCK MAINTENANCE

by L. J. Hoefkens, A.I.Prod.E.

The need for efficient maintenance—that is, regular maintenance by expert personnel—would appear to be so obvious that it would not seem to be necessary to emphasize it. Nevertheless, it is frequently neglected altogether until a serious breakdown occurs or alternatively it is not carried out on a properly planned basis and accurately costed. This surprisingly enough does happen even in establishments where the need for efficient maintenance is appreciated for the means of production such as machine tools, process plant, prime movers, etc.

Examination of such simple items as sack trucks and 4-wheel trolleys will often reveal that one or more of the wheels is badly worn and needs urgent replacement. Floors are badly worn as a result and the effort to move the truck has considerably increased, yet strangely enough managements overlook these points and often the operator himself does not complain. When we come to more complicated industrial trucks such as fork lift trucks, side-loading trucks and other highly specialized trucks the need is very much greater. In fact, it is of paramount importance. These types of trucks, when purchased, have usually been justified on the basis of their economy in manpower or space, or both, in the handling of certain materials, or in receiving, warehousing and despatching of goods. To make these envisaged savings factual then, the surplus labour will have been diverted to other work or will have been absorbed by the filling of vacancies elsewhere in the organization. Whichever has taken place, the result is the same, the new mode of working has been made very dependent on the industrial truck.

Consider a palletized store using fork lift trucks. The materials contained in pallets are stacked up to the roof, and there is no alternative method of manipulating them other than with the truck. Therefore, a lengthy breakdown could have a serious adverse effect on production and output. On the other hand, with racks and bins and floor storage methods using simpler trucks, manual handling takes place and a truck breakdown is not so serious. Even where certain forms of conveyorized handling exist, if a breakdown occurs, temporary alternatives can nearly always be organized.

A similar situation arises where trucks with special handling devices, such as roll clamps, are used. The dependence upon all these material handling devices means that the truck must always be available when required and consequently all possible measures must be taken to safeguard production, output and the movement of materials by ensuring through efficient maintenance that the truck is not 'off the road' as a result of such a simple matter as lack of lubrication or the brakes in need of adjustment or for any other reason which it is possible to avoid.

Again if an industrial truck has been purchased as an integral part of a production flow process, such as the removal of swarf from high quantity producing machines, the feeding of machine tools and presses or for the movement of materials in between processes it is as vital to ensure that the truck is always available as it is to see that the machine tools are kept running.

Lastly, these large and specialized material handling trucks are expensive pieces of equipment and in common with all other assets of a company merit care being taken of them so that they will last their calculated span of life incurring at the same time the minimum amount of upkeep expense and disruption of the work with which they are associated.

Types of Maintenance

The maintenance and care of industrial trucks can be classified under the following headings, namely: (*a*) preventive maintenance; (*b*) periodic overhaul; (*c*) breakdown service.

Preventive maintenance can but be described as the regular attention, mainly, to moving parts or working parts, in order to ensure that the vehicle operates efficiently and to reduce the possibility and the need for a major repair. This type of maintenance also includes minor adjustments to parts subject to wear and deterioration through use.

Periodic overhaul is of necessity a lengthy procedure and entails the stripping down of the major components subject to wear, in order to replace such parts before a complete failure takes place, thereby reducing the effect of wear of one component on another and also minimizing a breakdown during working hours of an extended nature. If a regular and satisfactory preventive maintenance programme has been operated then no doubt the periodic overhaul can take place during the annual factory vacation which would mean that trucks would not have to be taken out of commission for this purpose and would reduce any need for 'spare' trucks.

A breakdown service is an efficient service which must be available in case of a breakdown which might, and will occur in spite of the other precautions taken in the form of preventive maintenance and periodic overhauls.

Efficient maintenance can only be achieved if the following essentials exist: (1) support from management; (2) stocks of spare parts; (3) adequate facilities; (4) competent personnel.

In common with other aspects of industry, to be successful management must give its full backing and support to a planned maintenance policy in the interests of production and cost. It should be a strict rule that trucks with a defect should immediately be repaired, it should not be deferred to 'another day'on the basis that the truck cannot be spared. 'A stitch in time saves nine' applies here also and a minor defect if allowed to persist can result in a serious breakdown with a greater loss to production.

Adequate stocks of wearing parts should be on hand. The selection will be made in the light of experience and can usually be kept to a minimum if one is fortunate enough

VEHICLE LOG SHEET

Type of Truck : *2 TON PETROL* **Reference No. :** *3*

STORES ISSUED

TIME & DATE	FUEL (GALS)	OIL (PINTS)	ISSUED BY	DRIVER'S SIGNATURE	TIME & DATE	FUEL (GALS)	OIL (PINTS)	ISSUED BY	DRIVER'S SIGNATURE
8 a.m. 1.3.55	6	2	*A. White*	*T. Smith*					
8 a.m. 2.3.55	5	1	*A. White*	*C. Brown*					

DATE	DETAILS OF WORK	DRIVER'S SIGNATURE	HOURS WORKED	
			DAILY	ACCUMULATIVE
1.3.55	*Store work stacking*	*T. Smith*	8½	8½
2.3.55	*Unloading vehicles*	*C. Brown*	9	17½

RECORD OF DOWN-TIME

DATE	REASON	FROM	TO	MECHANIC'S SIGNATURE
1.3.55	*Fractured hydraulic hose*	10.15 a.m.	10.45 a.m.	*S. Green*
2.3.55	*Blocked petrol feed*	2.00 p.m.	2.35 p.m.	*S. Green*

Fig. 1 (*above*). *Vehicle log sheet*

Fig. 2 (*below*). *Maintenance forecast chart*

MAINTENANCE FORECAST CHART

TRUCK	MAINTENANCE DUTIES	LAST DONE	4.6.55	11.6.55	18.6.55	25.6.55	2.7.55	9.7.55	16.7.55	23.7.55	30.7.55
		HOURS RUN	6162	6213	6258	6308	6353	6397			
PETROL NO. 1	OIL CHANGE	5996		6196							
	FILTER RENEWAL	5996									
	TRANS. OIL CHANGE	4821									
	DECARBONIZE	4821									
	CLUTCH RENEWAL	4821		6196							
		HOURS RUN	1050	1101	1149	1199	1248	1292			
ELECTRIC NO. 2	BATT. EQUALISING CHARGE	1000					1248				
	CHECK CONTACTS	847			1149						
	RENEW. BRUSHES										
	TRANS. OIL CHANGE					1199					

PREVENTIVE MAINTENANCE SHEET

Truck No.: *2* **Date:** *5.6.53* **Hours Run:** *4296*

	MAINTENANCE DUTIES	COMPLETED	MECHANIC'S REMARKS
1	*Check steering joints and lubricate*	√	*New tie rod pocket required for offside*
2	*Check U bolts*	√	*Needs constant tightening. New bolts required?*
3	*Check brake pedal adjustment*	√	———
4	*Check clutch pedal adjustment*	√	*All clutch adjustment taken up*

MECHANIC'S SIGNATURE: *S. Green* SUPERVISOR'S SIGNATURE: *J. McVie*

Fig. 3. Preventive maintenance sheet

to be within easy reach of the truck maker's service depot or factory. Facilities for maintenance are necessary if one is intended to carry out maintenance on the spot and not place entire reliance on the maker's service engineer. It will depend largely on the existing facilities for maintenance and the number of type of industrial trucks in the fleet as to how extensive the facilities such as tools, lifting jacks, and testing equipment is provided. Last, but by no means least, competent mechanics are essential in order quickly to diagnose trouble and to rectify it with the minimum of delay. The assistance of the truck manufacturer should be sought for the training of maintenance personnel especially when new types of trucks are introduced into an organization.

How to Plan Maintenance

Fork lift trucks will be taken as a practical example to describe the planning of maintenance of industrial trucks for the reason that as a category of truck they are probably one of the most complicated trucks used in large quantities in many industries. For other types of trucks the same principles apply but should be amended in detail according to their particular application. From the point of view of maintenance, overhaul and repairs, a fork lift truck can be considered to be in the same category as a commercial motor vehicle. However, from the point of view of operating conditions, it differs considerably in as much as it will, in all probability, be performing a considerable amount of work under arduous conditions, often without respite. For example, the amount of wear and tear of the clutch and, consequently, its anticipated life, in stacking work and pallet shunting in a busy and densely packed palletized store or warehouse, bears no relation to the life of a clutch in an ordinary motor vehicle or industrial truck. Again, in the case of battery-propelled trucks, the amount of stacking and the breaking down of stacks of palletized materials will have a great bearing on the number of batteries required per shift and the amount of attention they will need. The conditions of roadways and factory floors again will influence maintenance work.

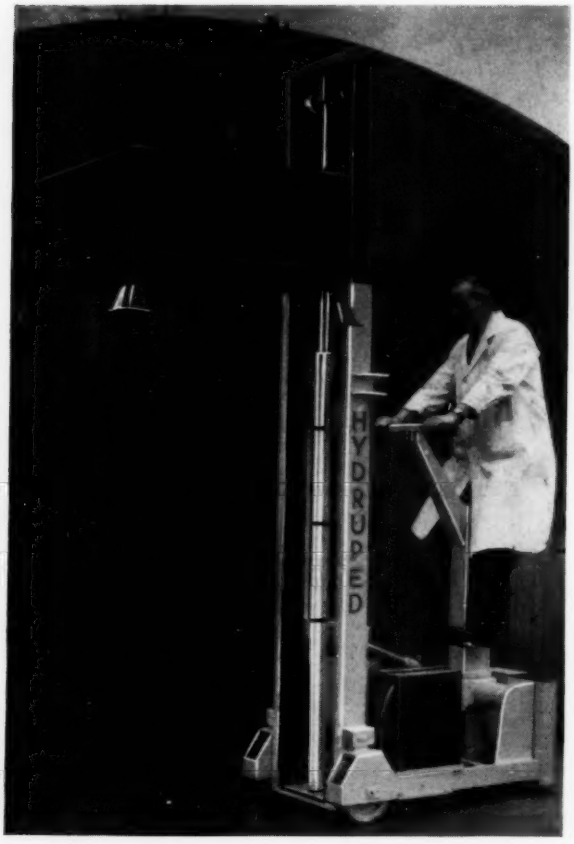
It will be appreciated then, that individual conditions of working must be known and studied before planned maintenance can function and, for this reason, it is necessary to commence to build up a history of operating experience.

The same type of maintenance information and recommendations as supplied by the makers of commercial vehicles can be used to form a basis for a fork lift truck, the maintenance duties will be very similar, but the road mileage stages or intervals, when action is required, will have to be found out by trial in the light of individual experience. Working conditions vary considerably between factories and even between similar trucks so that no hard and fast rule can be laid down or recommended. The maker's advice should be used as a basic guide. With the commercial road vehicle the criterion for maintenance is fundamentally road mileage, but with the fork lift trucks such a basis could be entirely misleading. The reason for this is that a high proportion of fork truck 'work' can take place while the truck is stationary and often in this position the engine is running faster than when the truck itself is moving; for instance, when placing pallets in a high stack. A similar case applies to electric fork lift trucks; a greater strain is placed on the batteries when a load is being raised at the same time as the truck approaches a stack than when it is merely coasting down a gangway. Therefore the basis for the maintenance chart of a fork lift truck should be calculated and expressed in truck working hours.

To obtain these working hours some planning and a deal of common sense is required. Each truck, before being put into service, should be allocated a serial number which should be painted prominently on the vehicle. Thereafter it will be treated as an individual machine for maintenance and costing purposes, and will always be known and referred to by this serial number. Next each truck should be provided with a log book, which again bears the truck number and appertains to one truck alone. A sample page, as a typical example of a suggested log book, is shown in Fig. 1. In the log book is maintained a record of the fuel and oil issued to the truck; details of the kind of work performed, the number of hours of work performed, the name of the driver using the truck and the nature and duration of any breakdown or maintenance work required to be carried out during working hours. In the case of electric vehicles, the fuel issued is replaced by the amount of electric power used by its battery charger from the mains in replenishing the batteries. This item can be recorded by means of a meter in the power supply and entered in the log book.

So much then for the planning side. Now for the contribution of common sense. After a short experience, the log book will indicate the hours worked by the individual truck. Simultaneous with this should be ascertained the approximate mileage covered by the truck and what proportion of its time is taken by stacking or lifting work, and what proportion is purely travelling time. The unknown factor is the amount of work the engine or battery has performed while carrying out work other than travelling. This must be estimated by exercising one's judgment. Let us say, for example, that we find that in an eight-hour shift the truck travels 20 miles during $4\frac{1}{2}$ hours, and that the remaining $3\frac{1}{2}$ hours is occupied by stacking pallets. We will assume that the stacking work is estimated to be equivalent to $2\frac{1}{2}$ times the engine work in travelling. Then we calculate that the stacking time is equivalent to $8\frac{3}{4}$ hours' engine work. When travelling, the engine work is equal to 4·4 miles/hr. Adding both times together, we have a figure of $8\frac{3}{4}$ hours plus $4\frac{1}{2}$ hours or a total of $13\frac{1}{4}$ hours' engine work, which, multiplied by 4·4 gives an equivalent road miles/shift of 59·6. This divided by the shift hours of 8 gives us our final answer of approximately $7\frac{1}{2}$ miles/hr, and is the figure which we will then use in establishing our experimental maintenance chart. The description 'experimental' has been used because it is the first maintenance chart and will be based on information obtained in the manner described, but it will be corrected, amended and adjusted in the light of experience until it is considered to be a truly reliable guide for planned maintenance.

Fig. 4. The Hydruped pedal-propelled fork lift truck



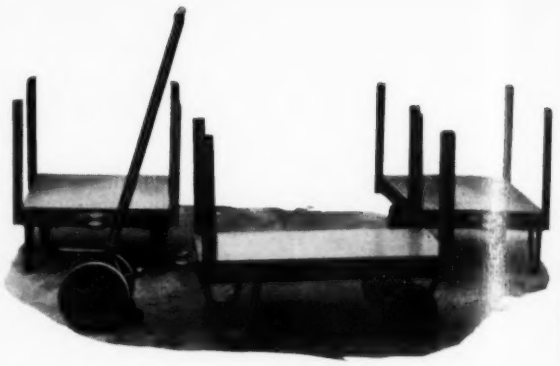


Fig. 5. Examples of lifting-tug-bars in connection with wheeled stillages made by Tyne Truck & Trolley Co., Ltd.

To quote now a practical example, let us take the changing of the engine oil. We have calculated earlier in the hypothetical case given that our fork lift truck engine works at a rate equivalent to $7\frac{1}{2}$ miles/hr. This in a 44-hr week equals 330 miles/week. For the same engine speed the average equivalent for a normal road vehicle would be about 15 miles/hr, and, as it is usual for makers to recommend changing the engine oil at about 3,000 road miles, we say that the ratio of the fork lift truck engine to the road vehicle engine is 2 to 1 and that 1,500 fork truck miles equal 3,000 road vehicle miles. This mileage will be reached in about $4\frac{1}{2}$ weeks, or, in round figures 200 working hours. This, then, is the figure which would be inserted on the maintenance chart; i.e. change sump oil at 200-hr. intervals. A typical example chart is shown in Fig. 2. This can, of course, be expanded to take care of any points which it may be deemed desirable to check. The forecast date can be outlined in the appropriate square and subsequently filled in by inserting the number of hours from the log book to indicate that the maintenance task was performed. These forecasts can then be adjusted as experience determines the correct interval of time. This would particularly apply to the clutch renewal in the case of a petrol or diesel engined truck.

How to Operate a Maintenance Plan

In order to put the maintenance plan into operation it is necessary to have the services of a trained mechanic, and in this connection the assistance of the supplier of the fork lift truck should be sought as they will be pleased to arrange for the training of a suitable individual, usually at their own premises. Again, by discussion with the maker of the truck, a basic stock of spare parts can be established and any special tools or equipment that may be needed. If a motor car or road vehicle maintenance department is in existence, then most of this will already be available.

In addition to the maintenance forecast sheet, which has earlier been explained in detail, the maintenance foreman, or whoever is responsible, should originate each week a preventive maintenance sheet, one for each truck. Its purpose is to instruct the mechanic which points on the truck need attention and for the supervisor to instruct the mechanic of any item of periodic maintenance which, according to the forecast sheet, needs carrying out at that particular time. There is also a space provided for the mechanic to record any item which he may find needs the attention of the supervisor so that he can determine when the truck should be brought in to have this work done. A section of a specimen sheet is shown in Fig. 3.

The illustration shows four typical points a mechanic would have to attend to and against them are shown the kind of comments which may be expected.

(1) Check steering joints and lubricate.

Remark: new tie rod socket required on off-side.

(2) Check 'U' bolts.

Remark: need constant tightening, are new bolts required?

(3) Check clutch and brake pedal adjustment.

Remark: all clutch adjustment taken up.

The maintenance supervisor receiving this document then has to decide when he will take the truck in to change the clutch: he would no doubt attend to the other points at the same time. The sheet has a space for the truck number, date, the total number of hours the truck has been run and the signature of the mechanic who has carried out the maintenance.

If these sheets are filed under truck number rotation then a record of regular maintenance is compiled. Previously it has been emphasized that the movement of materials and often production processes have been made dependent on the fork lift truck and, consequently, the breakdown service must be efficient and prompt. A breakdown which necessitates a truck coming off the road should be treated

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Fig. 6. A Matling 4 ft 6 in lift battery-powered Standard Stacker fitted with stainless steel swivel platform transporting rolls of dyed cloth

Fig. 7. B.E.V. electric rider-driven high-lift fork truck type RH.22, 1-ton capacity, handling banded unit loads at a Bryant & Mays factory

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with top priority in the organization, and no effort should be spared to get the truck back into operation with as little delay as possible.

The maintenance of the traction batteries of an electric vehicle require special mention because the treatment is rather different but nevertheless very important. In order to obtain efficient service from a battery and achieve its full span of life, well-known makers guarantee their traction batteries for four years; it is necessary that they should be charged and discharged in accordance with the recommendations of the manufacturers. It is very essential to have adequate battery capacity for the work to be done so that individual batteries are not overworked, otherwise the position can be reached where there is not sufficient time left in order to fully charge the battery. This in turn means that the truck will be out of action at some time when it is required. It is more economical to invest in an additional battery, to change over during the working shift, and to work each battery well within its capacity. This will ensure a full, efficient life, and there will always be a small reserve for the extra job or the occasional work to be carried out during extended hours, maybe to make up for a truck breakdown during normal hours. To achieve this it is imperative to keep the battery electrolyte to within the specific gravity limits laid down by the maker. It is done by checking the specific gravity, using a hydrometer and at the same time topping up the cells with distilled water where required. The checks should be made before each working period as an insurance that charging has properly taken place and again after each working period before topping up which will indicate whether the battery is adequate for the task and is not being overrun.

The external cleanliness of batteries is also an important point to which attention should be paid. An accumulation of dirt or foreign matter around the terminals can be the cause of a leakage of current and premature discharge of the battery.

How to Cost Maintenance

It is necessary to know the cost of maintenance as it forms a very important item in establishing an hourly operating cost of a truck. It is also required in order to decide when a truck should be replaced because it is no longer economical to repair and maintain, and it is extremely useful in making comparisons between trucks of different makes, or of the same make, but working under different conditions.

There are three items which require to be known and which comprise the maintenance cost.

(*a*) Cost of spare parts and lubricants consumed.

(*b*) Cost of labour employed on maintenance.

(*c*) Overhead charges on maintenance labour.

Here again if each truck has been given its own works serial number it can be treated as an individual truck for costing purposes.

The cost of spare parts is obtained by making an analysis of the requisitions withdrawing the spare parts from the maintenance stores. Each requisition should bear the number of the truck for which the parts are required and should be signed by a responsible authority.

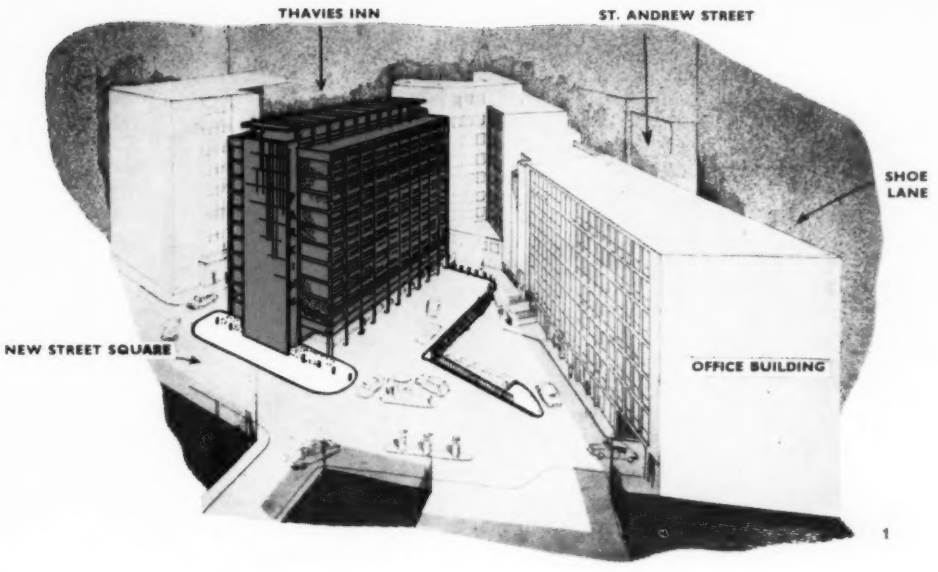
The cost of labour can be obtained either by making an analysis of job cards issued to cover maintenance work, quoting the number of the truck under repair or a system of daily work sheets could be used, whereby a mechanic records all work performed and the time taken, and he would quote the vehicle reference number. These sheets could then be analysed daily or weekly.

There are obviously several ways of obtaining this information and a method should be adopted which fits into the existing routines and gives the required information in the simplest and least expensive manner. The important point is the appreciation of the need for maintenance and for a few common-sense methods of management control.

Lastly, it was mentioned earlier that in the log book of each truck would be entered the nature of any maintenance or repair work carried out during the normal working hours of the truck and also its duration. If this information is transferred weekly on to a card for each truck, it will provide a record of the 'downtime' of the truck. This is a useful document for the transport controller as it will give him a true indication of the value of maintenance or the effects of the lack of it. In circumstances where a mixed fleet of trucks exists, i.e. petrol, diesel and electric it will show those types of breakdowns which are common to all three kinds of trucks and those which are only applicable to say, petrol trucks. This kind of information is most helpful when trying to decide upon the merits of one type or make of truck by comparison with another.

This record is not a duplicate of the record of the maintenance hours worked, because if, for instance, a truck suffers a breakdown of a serious nature, several mechanics may be assigned to the job, for varying lengths of time, in order to reduce the 'downtime' and its effect on production. For example, three mechanics could work on a breakdown for 6 hours making a total of 18 man hours of maintenance time, but a 'downtime' of only 6 hours would have been incurred.

Fig. 8. Ransomes N.R. 25 fork lift truck accurately stacking apples in a cool room store



MECHANICAL CAR PARK FOR LONDON

WHAT may well be the first mechanical car park to be operated in London will be built on a site in Shoe Lane near Holborn Circus in the City with an associated office building. The development is being undertaken by Parcar, Ltd., a company owned jointly by Mitchell Engineering, Ltd., of London and Peterborough, and The Unit Construction Co., Ltd., of Feltham, Middlesex.

The mechanical car park, which will be separate from, but adjacent to, the office building, will be ten storeys high and will be equipped with two lifts, each capable of carrying two cars at a time and cars will be moved from the lift and parked by mechanical dollies. It is estimated that four cars a minute can be parked under this system. Drivers will drive into the ground floor, leaving their cars to be parked mechanically. Accommodation will be provided on the site for about 240 cars. A petrol station together with servicing bays are included in the project, which will offer 'round-the-clock' service.

The rates for parking have not finally been worked out, and in many cases are a matter for the operator. Despite the high site values applicable to this part of London, there is no reason to suppose that charges will differ materially from the normal London charges for undercover parking.

Each lift will be controlled by one operator at a vertical speed of 300 ft/min and horizontal speed of 150 ft/min. The lift platform carries two cars at a time which can be unloaded separately or simultaneously.

Overall dimensions of the garage are 66 ft wide, 100 ft long and 99 ft high. It is estimated that $\frac{3}{4}$ mile of road space would otherwise be required to accommodate the 240 cars which will be housed in the small area covered by the mechanical car park.

The adjacent office building will be seven floors high and there will be 40,000 sq. ft. of office space. Work on the site is expected to begin in June, 1960, and both buildings will be completed in about twelve months thereafter.

Fig. 1. *Artist's impression of the mechanical car park and associated office buildings*

Fig. 2. *Side view showing a car mounted on the lift platform*

Fig. 3. *Front view of lift showing cars side by side on platform*

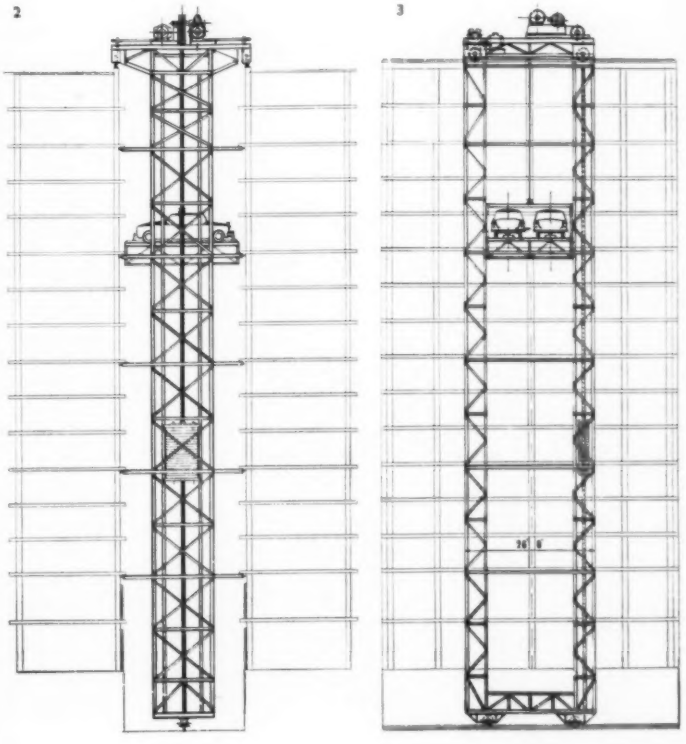


Fig. 1. From the hold of the specially constructed bulk raw sugar ship 'Crystal Diamond' special cranes scoop up to 400 tons of sugar an hour and drop it on to the shed conveyor belt. The vessel unloaded its cargo of 10,351 short tons in 35 hr

MECHANICAL HANDLING AT MODERN SUGAR REFINERY

by J. Grindrod

CLAIMED to be the first major industry to be established in Toronto, Ont., Canada, based on the transportation advantages to be derived from the St. Lawrence Seaway, a new $13 million sugar refinery has recently been placed in production on the city's waterfront by the Canada and Dominion Sugar Co., Ltd. It is also Ontario's first complete refinery, Canada's fourth operating cane-sugar refinery as distinct from sugar beet processing plants and, as far as is known, the first complete sugar refinery built in the world during the past quarter-century. It is intended to meet the ever-growing demands of the expanding population in the Toronto-Hamilton-Niagara Falls area and to give a better service to industrial and household consumers. Her Majesty Queen Elizabeth and His Royal Highness, the Duke of Edinburgh were the first official visitors to the refinery.

Deep sea vessels from the tropical ports of two hemispheres unload their cargoes of raw sugar at the new Redpath refinery. By way of the Seaway it is shipped direct from the West Indies, Australia and Mauritius without prohibitively expensive transhipment at Montreal.

Contained on a 10·5-acre site, the plant has a capacity of 1,300,000 lb of granulated white sugar per day. Its buildings have a floor area of 310,000 sq. ft. and the plant itself incorporates an estimated 35 miles of installed piping, ranging from large-scale conduits to wire-thin copper tubes. The major buildings in the group, connected by aluminium-clad conveyor bridges, include a 135-ft high main process building, a raw sugar shed, packaging and refined sugar storage buildings and twin silos 148 ft high, each accommodating 10 million lb of refined bulk sugar. The entire plant is highly automated, with numerous control stations. At no stage in the processing is the sugar touched by human hands.

Special bulk sugar unloading cranes at the wharf are able to discharge two hatches of an ocean-going vessel simultaneously, at a combined rate of 400 ton plus/hr. These Colby level boom cranes are the only ones of their kind on the Great Lakes. Besides being used by C. and D. for unloading raw sugar, the unloading equipment will be available for handling bulk cargoes other than raw sugar at

Fig. 2. From the unloading cranes on the wharf raw sugar is carried on a belt conveyor along the sugar shed into the weigh house, thence into the shed at its apex

the port of Toronto.

The raw sugar is taken from the cranes by conveyor belts to a weigh station at the south-east corner of the bulk raw sugar shed, which has an overall length of 509 ft, an overall width of 140 ft and a capacity of 80,000 short tons. At the weigh station two Toledo scales automatically weigh the raw sugar and the weights recorded are used to calculate the payment weights and by the customs for calculating the amount of duty.

From the scales the raw sugar is elevated up to and along the inside of the apex of the shed by way of inclined belt conveyors which travel from the weigh station across the southern gable end of the shed to a transfer point well at the rear of the gable end and thence by further inclined conveyor to the roof apex point, where it enters the building via another transfer point. Along the vault of the roof a shuttle belt drops the sugar at the required position within the shed so as to form a pile below. The pitch of the roof of the shed conforms to the unique angle of repose of the raw sugar. By so building around the pile of sugar construction costs were kept down much below what they would have been had the building walls been stressed for lateral thrust, as is the case with grain elevators.

When required by the refinery, the raw sugar is drawn out from beneath the pile by conveyor belt below the floor, on to which it is pushed by a small bulldozer, and taken to the top of the process block by way of one of the aluminium-clad conveyor bridges.

By gravity and pressure systems the raw sugar flows down

Fig. 3. Overhead conveyors build up a mountain of raw sugar under the sloping roof of the shed and a small tractor assists the gravity flow of sugar into the openings in the floor whence it is conveyed to the top of the process block

through a succession of vats, tanks, mixers, melters, heaters, filters and other huge processing units in the processing building, some of which extend through two and three levels of the building, to emerge below as pure white crystals. Electronic controls operate remote equipment and regulate the smooth flow of materials.

Moist refined sugar from the centrifugals is conveyed to the granulators where all but 0·01 to 0·02 per cent of the moisture content is removed before it is passed by conveyor belt either to the packaging building or to storage silos. Constructed immediately in front of the refined sugar warehouse, the packaging building contains bins on the upper floors for bulk sugar storage whence it is fed by gravity into the screening machines where it is graded for crystal size on the floor below. At the lines of filling and packaging machines, devices carefully and quickly weigh, fill and seal 5 and 10-lb Redpath bags. For 1-lb packets of icing sugar, a separate complicated machine forms its own wax paper-lined boxes, which it fills, seals and delivers in quantity ready for placing in cartons.

As the sugar is packaged and bagged on the upper floors it is dropped to lower floors for preparation for storage and despatch. A revolving sorting table is used to separate the cartons as they come off the conveyor line, the 5-lb and 10-lb granulated bags being automatically made up into 50-lb packets and palletized ready for fork truck handling. The refined sugar warehouse has a storage capacity for over 25 million lb of sugar in bags, packets and cartons, all of which are loaded on pallets.

For storing the refined sugar prior to packaging there are two silos each capable of holding 10 million lb in bulk. The silos have a special wood inner lining so that the sugar never touches the concrete, but is circulated in the silos to prevent setting and to keep it in perfect free-flowing condition.

Fig. 4. Packed sugar to the extent of over 25 million lb can be stored on pallets in the refined sugar warehouse

The new Toronto refinery produces 42 different packages of sugar as well as bulk granulated and liquid sugars for industrial use. Trucks of the Redpath fleet deliver bulk granulated sugar pneumatically in 34,000-lb loads to industrial users, while railway 'airslide' cars transport it in 120,000-lb bulk consignments. Bulk liquid sugar road tankers deliver 3,000 gal/load to industrial users.

Approximately three-fourths of the refinery, including much equipment never before made in Canada, was engineered and fabricated by Canadian firms. The planning, designing and equipment installations were supervised by the company's own engineers, assisted by Tate and Lyle Technical Services of London, England. The general contractors for the equipment installation were Canadian Comstock Co., Ltd. With additional machines, the present production of 1,300,000 lb of white sugar per day can be trebled and provision has been made throughout the plant for this expansion.

Sir Ian D. Lyle and Mr. Peter Runge of Tate and Lyle, Ltd., are on the board of directors of the Canada and Dominion Sugar Co., Ltd., and Tate and Lyle, Ltd. have recently acquired a controlling interest in the Canadian company. The Sugar Line, Ltd., a United Kingdom shipping group associated with Tate and Lyle Ltd., who will carry raw sugar to Canada, has expanded its freight-carrying capacity in anticipation of a greater demand for bulk shipments from refiners all over the world, the specially constructed bulk sugar ship *Crystal Diamond*, for instance, having a cargo capacity of over 10,000 short tons which can be discharged at Toronto in 35 hr.

Fig. 5. The packaging room where 5-lb and 10-lb bags are made up and taken by conveyor line for grouping into 50-lb parcels

FORGEMASTERS' FLEET OF FORTY FORK TRUCKS

by P. C. MacCulloch*

GARRINGTONS, LTD., a member of the Guest, Keen & Nettlefolds group of companies, justly claim to be one of the leading forgemasters of the western world. Since the war, the main works at Bromsgrove, Worcestershire, have been considerably extended and the most up-to-date equipment for all forms of forge production have been installed. These extensions have involved the erection of a completely new press forge shop, with ancillary service areas to accommodate large-scale stocks of the raw materials, heat-treatment plant, shot-blasting facilities and dispatch bays. In addition, separate Divisions have been created for the production of turbine and compressor blades, and also the development and manufacture of induction-heating equipment.

Together with their well-known designs of engineers' hand tools, the industries supplied by Garringtons with high-quality forgings embrace those manufacturing private cars, commercial vehicles, tractors, agricultural equipment, aircraft, mining equipment and shipyard gear. The variety of components produced runs into many thousands and the potential capacity of the enlarged production facilities was anticipated to be in the region of 132,000,000 forgings a year.

It will be appreciated that, with finished components being produced on this scale, necessitating many process operations between the stages of cropping the raw steel and final dispatch, the materials handling operations were many, varied in content and at a very high level of activity.

The main bulk of this movement depended on powered mobile equipment, e.g. fork trucks, platform trucks, tractors and trailers. By 1958 the increasing demand for forged products necessitated further extensions to production capacity resulting in a greater volume of work being handled throughout the works. This demand, coupled with the need to prepare for the replacement of the older fork and platform trucks, made it imperative that there should be a complete reassessment of the company's material handling policies.

The transport manager, in collaboration with the chief work study engineer, made a careful investigation of the existing and anticipated materials handling requirements and in a comprehensive report made a series of proposals.

Briefly, the main proposals were that:—

A policy for the progressive standardization of containers, tote boxes, pallets, etc., be implemented.

A planned renewal policy for the existing mobile mechanical handling equipment be put into effect.

*L. W. Bailey & Partners, Ltd.

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Fig. 1. General view of the garage showing the well defined areas for truck and car maintenance—grids in the foreground cover inspection and drainage pits

Fig. 2. A mechanic checks the mechanical maintenance schedules for a Conveyancer truck undergoing routine servicing. Schedules covering electrical and lubrication work are similarly displayed on wall notices in the appropriate service areas

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BATTERY WORKING AND CHARGING CYCLES

			1st Period	2nd Period	3rd Period	4th Period	5th Period
	Plant No.	Shift	8.0 a.m.—1.30 p.m.	1.30 p.m.—5.6.7.8.0 p.m.	8.0 p.m.—1.0 a.m.	1.0 a.m.—8.0 a.m.	8.0 a.m.—1.30
Stacatruc	2041	Days	At Work. Battery A1	At Work. Battery A2			At Work. Batter
Stacatruc	2042	Nights			At Work. Battery A3	At Work. Battery A1	
Charger	2001	—	On Charge. Battery A2	On Charge. Battery A1	On Charge. Battery A1	On Charge. Battery A3	On Charge. Bat
Charger	2002	—	On Charge. Battery A3	On Charge. Battery A3	On Charge. Battery A2	On Charge. Battery A2	On Charge. Bat

ABOVE
Fig. 4. Part of the battery-schedule chart showing the interchange of three batteries between two fork trucks and the times of working and 'on charge'

Fig. 3. The lubrication service area. A comprehensive Tecalemit installation is contained within the tiled wall on the right. Note the ingenious method of draining the truck axle oil via the small tank on the end of an extending swivelling arm

A co-ordinated system of materials handling covering the whole company be planned and put into effect.

Relative costs, concerning existing practices and new methods and equipment, were assessed. It was anticipated that the greater efficiency of service provided by a new fleet of fork trucks, coupled with the improved system of control, would amortize the initial capital costs in approximately seven and a half years.

The proposals were accepted by the senior management of the company and authorization for replacement of existing trucks and for the acquisition of additional trucks was given.

The transport manager was entrusted with the task of ensuring that the new trucks, drivers and ancillary maintenance equipment formed a well-knit work force, with the objective of backing the production facilities of the company with an efficient, reliable materials handling service.

This objective, in the writer's opinion, has been well met and its achievement stems from three main policies underlying the whole of the materials handling system. These policies involve:—

1. Keeping equipment at its maximum operating efficiency.
2. Careful allocation and control of equipment on specific tasks.
3. Enhancing the status of mechanical handling equipment drivers and giving recognition to this status.

The acquisition of new fork trucks to replace old equipment provided the foundation for achieving point 1 above. The task was now to maintain that equipment.

Mechanical and Electrical Maintenance

A new garage was planned and erected at Bromsgrove. This has been fully equipped with modern maintenance equipment and serves the whole mechanical handling fleet and the works' cars. A particular feature is the extremely high standard of cleanliness obtaining in the area.

Power-supply pipes and conduits have all been painted in British Standards Institution colours; the problem of oil patches due to oil changing has been eliminated by providing waste tanks let into the floor and covered by metal grids, in two sections—small integral pumps emptying the tanks when needed. Waste bins are provided at each work bench and it is obvious that to the mechanics working within the garage its condition is a source of personal pride.

Preventive maintenance is the governing consideration with regard to the main work performed on the fleet of 40 fork trucks. Taking the manufacturers' recommendations, a schedule of planned maintenance has been evolved. This consists of regular mechanical and electrical equipment inspections, lubrication, oil changes, etc., at fortnightly, monthly, three-monthly and six-monthly intervals. At the same time each fork truck is inspected every 14 days. This regularity—the day is specified in advance—is a basic feature of the preventive maintenance programme and demands that four fork trucks are inspected each day. Two trucks, painted in distinguishing red and black diagonal stripes, are available as spares to replace the normal-duty trucks when the latter have to be temporarily withdrawn from their work areas for maintenance or battery-changing purposes.

Within the maintenance areas, large wall notices are displayed listing the standard checks of the manufacturers' recommended maintenance practice. These help to ensure that no points are overlooked and have proved to be of considerable assistance to the engineers performing the work.

Job cards are raised for all forms of maintenance—these record details of the vehicle, type of standard preventive maintenance to be performed or details of a specific fault requiring attention, names of the mechanic allotted to the job, the person reporting the defect and whom it was reported to in the first place. On the reverse of the card there is provision for noting the work carried out, the nature and quantity of materials used and the signature of the mechanic who did the job. Finally, at the foot there is a space for the signature of the driver of the truck. This latter facility is of interest in that the driver must satisfy himself that any

	Plant No.	Shift	6th Period	7th Period	8th Period	Department	Driver	Time and Day for
			1.30 p.m.—5 6 7 8.0 p.m.	8.0 p.m.—1.0 p.m.	1.0 a.m.—8.0 a.m.			Preventive Maintenance
	204[illegible]	Days	At Work. Battery A3			Press Forge		
	204[illegible]	Nights		At Work. Battery A1	At Work. Battery A2	Press Forge		
	200[illegible]	—	On Charge. Battery A2	On Charge. Battery A2	On Charge. Battery A1	—		
	200[illegible]	—	On Charge. Battery A1	On Charge. Battery A3	On Charge. Battery A3	—		

defect has been adequately remedied before taking the vehicle out of the garage. This encourages the driver's interest and emphasizes his own personal responsibility for the condition of his truck.

Battery Maintenance

One of the most critical factors in electric fork truck utilization is that of maintaining the batteries' condition. By laying down a rigorously enforced time-table for the regular charging and changing of batteries, coupled with up-to-date charging equipment, Garringtons have ensured that their fork truck batteries are maintained, at all times, at the optimum level of efficiency.

The fork truck fleet is split in two—day shift and night shift. Three batteries are allocated to a pair of trucks (one working at night and one during the day). All batteries have an alpha-numerical designation painted on them, e.g. A1, A2, A3, and this is repeated on the respective trucks. This ensures that any mix up of batteries can be quickly seen and rectified.

A carefully planned battery-charging time schedule has been worked out over the day and night shifts. This is so arranged as to ensure that no battery is worked more than 6½ hrs consecutively and has at least 12 hrs 'on charge' between working periods. The illustration Fig. 4 shows a part of the overall schedule: this portion covers three batteries, two fork trucks and two chargers.

Between 1.30 a.m. and 3.36 a.m. the night-shift trucks return from their work areas to the charging bay and change their batteries. The day-shift trucks change batteries between 1.30 p.m. and 3.36 p.m. each day. With some 20-odd trucks working during the day the time interval allowed for individual trucks to change batteries is approximately 6½ mins. Taking into consideration that these trucks are working at varying distances—up to ½ mile—from the charging room, it can be appreciated that this time schedule demands a high level of co-operation between those responsible for the actual work of changing the batteries and the truck drivers in timing their arrival in the charging area.

The layout of the charging room, with an overhead electric hoist covering the length and width of the area, allows this changeover to be performed with the minimum time loss. As a further help in keeping to the schedule, each truck has a plate showing the exact time for its battery change fixed on the mast frame where it can be easily seen by the driver.

The charging room runs the whole length of one side of the garage and is separated from the latter by a solid wall. On this wall is mounted the charging equipment, supplied by Legg Industries, Ltd., and the Westinghouse Brake & Signal Co., Ltd. The area where the batteries stand is tiled and drainage is provided to allow the whole area to be flushed down to remove any acid contamination.

On the outside wall of this area, a simple canopy has been attached. This provides a covered outside-parking space for day- or night-shift trucks when not working. Provision has been made to allow the batteries on these parked trucks to be charged 'in situ' via cables and wall plugs through the wall of the charging room and then via conduit to the row of chargers.

Fig. 5. General arrangement of the charging room. The lower numbers, alongside the charging plugs, are those of the particular trucks using the plugs

This facility for charging batteries on their trucks is to be extended. An electric-cable drum will be provided in the garage maintenance area so that batteries can be charged 'in situ' while at the same time mechanical or electrical maintenance is carried out on the truck itself.

Although the battery maintenance scheme has only been fully operative over the last few months—the final installation of charging equipment being completed in December, 1959—the advantages are already apparent, especially in relation to the increased reliability of service provided by the fork trucks to all production activities.

Status of Fork Truck Drivers

It was the opinion of Garringtons' management that the service provided by the fork truck drivers could be enhanced if some way of increasing their interest in their responsibilities could be devised. With this in mind a series of steps, designed to highlight the importance and responsibilities of their job, were put in hand. In the first instance this took the form of encouraging a personal pride and responsibility in the equipment they used. It was argued that, after all, a fork truck was an expensive piece of machinery—equivalent in price to a high-quality private car!

Fig. 6. A battery change on an E6-24 Conveyancer truck. This whole operation—removing the 'worked' battery and replacing with a charged one—is completed within 3 minutes

The changeover to new trucks afforded the opportunity of promoting the personal interest of the drivers in their equipment. All the fork trucks used on routine shift working are painted in striking—and smart—yellow and black diagonal stripes. Further, a driver is allocated one particular truck. To emphasize this the driver's name is prominently displayed on the top of the truck and there are strict company instructions to the effect that no one other than the named driver may drive that truck. Exceptions are if the driver is absent or the truck is taken to have its batteries changed by a garage driver, who leaves one of the spare trucks.

Each driver is issued with a personal internal-transport driving licence. This takes the form of a small booklet in a protective plastic cover, and must be carried by its owner whenever driving his truck. Any member of the company's safety committee or supervisory staff may demand to see a driver's licence. This licence, and the use of name plates on all trucks, ensures that driving of trucks by unauthorized persons can be checked and eliminated.

Every driver must pass a test of competence on fork truck operating and a medical examination before receiving a licence. The details contained in the licence are as follows: particulars of the driver; particulars of the truck he is authorized to drive; medical examination dates; details of the merit allowance scheme; safety rules governing fork truck operations; provision for recording driving offence endorsements.

The provision of a highly organized, scheduled maintenance programme has also served to encourage the interest of the truck drivers. The changeover time for batteries was viewed with some scepticism when first advocated. Now, having worked the system and experienced the advantage of having reliable and adequate battery power at all times, the drivers make it a matter of honour to return to the charging room at the exact time specified for their truck.

Merit Award Scheme

A merit allowance scheme has been devised in order that some award, of a tangible nature, could be made in recognition of individual interest and efficiency on the part of a fork truck driver.

Basically, the scheme consists of a merit allowance rate/hr which is added to the basic rate of pay. Two hundred points are allocated to each driver each fortnight—to qualify for the maximum merit allowance a driver must not lose more than 18 points in the fortnight. Points are allocated to particular facets of the driver's reponsibilities. The following table shows how the total of 200 is divided:

Item	Points	Remarks
Time keeping.....	50	25 awarded weekly
Care of truck.....	90	awarded fortnightly
Absence (without justification)	20	10 awarded weekly
General conduct and behaviour	40	20 awarded weekly
TOTAL	200	awarded fortnightly

It will be noticed that the 90 points awarded for care and cleanliness of trucks are assessed fortnightly—this is because

Fig. 7. The 'parade' of trucks in the outside-parking area, note the drivers' name plates on each truck. The plugs and cables attached to the wall allow the parked trucks' batteries to be charged 'in situ'

Fig. 8. A Conveyancer truck delivering forgings to a forging store. The box pallets seen here are the main standard container used throughout the works. Each pallet has its tared weight displayed, thus considerably simplifying the weighing of the components

Fig. 9. Example of a fork truck driver's merit award record card (left)

TRUCK DRIVER'S RECORD CARD

Name BLACK, J. *Truck* STACATRUC

Clock No. 3003 *Plant No.* 2041

MAXIMUM POINTS FOR ONE WEEK ALLOCATED FOR 100% EFFICIENCY

45	25	10	20		
Care and cleanliness	**Timekeeping**	**Absence**	**General conduct**	**Week No.**	**Driver's Signature**
	25	10	15	1.	
75	20	10	20	2.	
80	25	5	20	3.	
				4.	
				5.	
				6.	
				7.	
				8.	
				9.	
				10.	
				11.	
				12.	
					Total Points Lost

assessment takes place when the trucks are in the garage for their fortnightly routine service and inspection. The garage foreman and the internal transport foreman assess the condition of the truck with regard to cleanliness, scrapes to paintwork, etc. The truck driver is given the opportunity of raising any objection or queries as to the reasons for the deduction of points from his total of 90 allowed under this heading.

The other headings are assessed weekly with points deducted if necessary. For example, any driver who is absent without producing a doctor's certificate or without a reasonable excuse loses 5 points for each day's absence. Again, under the heading of general conduct a driver may lose points for careless driving, indiscipline or other misdemeanour.

For each driver there is a record card covering a period of 12 weeks

DAYSHIFT Disposition of Both New and Existing Fork Trucks

Dept.	No.	Sections covered	Plant No.	Serial No.	Make	Type	Capacity	Mast height	Fork length	Battery Nos.	Make of charger	Serial No.	Plant Nos.		Truck driver	
															Clock No.	Name
Press forge	1	Steel issues to presses only	2060 2041	6E-142	Stacatruc	624E	6,000 lb	9 ft	42 in	A 1, 2, 3	Westalite	V43196 V42433	2001	2002	3059	Brown
Press forge	2	Press clearance, movement from first inspection to despatch deck	2043	6E-143	Stacatruc	624E	6,000 lb	9 ft	42 in	B 1, 2, 3	Westalite	V42422 V43186	2003	2004	3041	Annetts
Press forge	3	Despatch department, loading unloading	2045	6E-151	Stacatruc	624E	6,000 lb	9 ft	42 in	C 1, 2, 3	Westalite	V43187 V43191	2005	2006	3047	Mathews
Press forge	4	Taking off heat treatment, feeding shotblast and Brinells	2047	6E-144	Stacatruc	624E	6,000 lb	9 ft	42 in	D 1, 2, 3	Westalite	V42166 V43184	2007	2008	3034	Troth
Press forge	5	Feeding heat treatment and normalizing furnaces. Heavy work for first inspection	2049	6E-145	Stacatruc	624E	6,000 lb	9 ft	42 in	E 1, 2, 3	Westalite	V43190 V43192	2009	2010	3021	Wood

Fig. 10. *Part of the master chart showing the disposition, scheduled jobs, drivers, etc., of the whole fork truck fleet*

(Fig. 9). On this is shown the number of points awarded under the separate headings each week. At the end of the 12-week period the driver with the highest number of points to his credit qualifies for an additional lump sum merit award.

A chart displaying all the driver's points ratings up to the current week is prominently displayed near the 'clocking' station in the charging room.

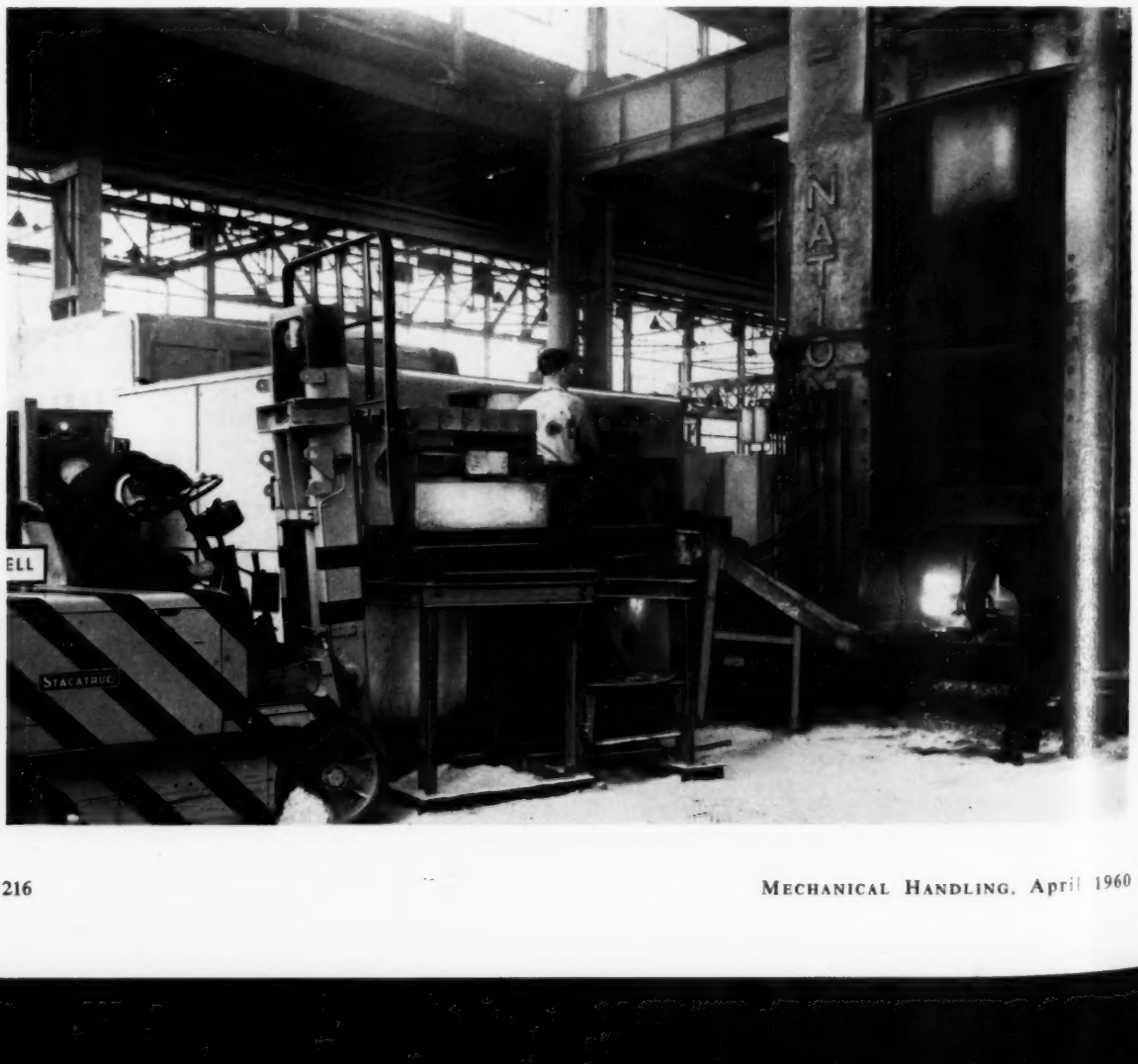
The merit allowance payable is a standard rate applied to each hour paid. Deductions to this hourly rate are made according to the points lost in the previous fortnight and are divided into four scales:—

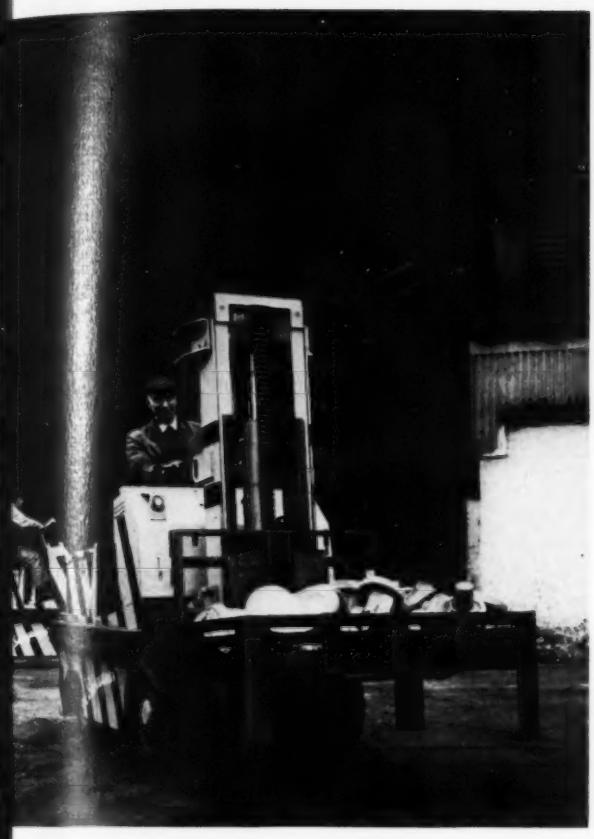
Scale	Points lost	Award
A	0–18	Full merit rate award
B	19–26	¾ merit rate award
C	27–48	½ merit rate award
D	49+	No merit award

The scheme has been most carefully explained to the drivers and has received their support and their union's approval.

The standard of cleanliness of the trucks is a credit to the drivers and there is no doubt that the scheme has considerably heightened the interest of drivers in the condition and

Fig. 11. *A 624E Stacatruc, working in the new press forge, supplying the induction furnace of a press with raw-steel billets*





ABOVE:
Fig. 12. Red-hot forgings from a hammer forge shop are carried to a cooling area by an E6-24 Conveyancer truck

RIGHT:
Fig. 13. Scrap material is also moved in pallets. A Stacatruc is here marshalling pallets in the scrap/dispatch area

operating efficiency of their trucks. This merit award scheme, coupled with the 'personalizing' of each truck with its driver's name and the regular preventive maintenance schedules, has considerably enhanced the driver's status and improved the service provided by the materials handling equipment with consequent benefits to production and increased efficiency in operation.

One example of the degree of enthusiasm shown by the drivers is seen in the request, by one driver, for a tin of a well-known car polish to apply to his truck!

Re-equipment

As mentioned before, one of the instigating factors for the overhaul of the materials handling service was the age and variety of equipment in use. Some of the old platform trucks had been bought second hand and had seen over 20 years of service. Pallets and bins varied widely in size and design and were not suited to standardized handling procedures.

Garringtons' management accepted the proposals concerning the necessity to rationalize the variety of mobile and static equipment, and the replacement programme for the powered mobile equipment is now complete.

There are now 15 new Stacatruc fork trucks model 624E of 6,000 lb capacity supplied by I.T.D., Ltd., and 14 new Conveyancer fork trucks model E6-24 also rated at 6,000 lb and supplied by Conveyancer Fork Trucks, Ltd. Some modifications have been made to both types of truck to protect them from the specially abrasive dust prevalent in the works. Dust seals have been fitted to the brake drums and to the lifting masts to minimize the effect of these conditions. On all trucks 'bumpers' of metal channel have been fitted round the bodies to protect the body plates and chassis. Modifications have also been made to the battery housings on the Stacatruc trucks to ensure fast and simple battery changing when using an overhead hoist.

In addition to the new fork trucks there are a further 10 electric fork trucks, two diesel-powered fork trucks and five Yale & Towne Worksavers. The latter trucks are used for movement of box pallets within the marshalling areas of the production shops.

The illustration, Fig. 8, shows the box-type pallet that is now the main standard container throughout the works. There are, at present, 4,700 of these pallets in use at Bromsgrove.

Work Control

All fork trucks, day and night shift, are allocated to specific areas and jobs. Master charts have been drawn up showing for each truck the department served, the operations to be performed within that department and details of the truck—part of a master chart is shown at Fig. 10. By this means the disposition of the whole fleet of 40-odd trucks coming under the control of the transport manager with all pertinent details can be seen at a glance. Thus alterations to duties, drivers, etc., can be more easily effected with all the relevant facts available.

CONVEYORS

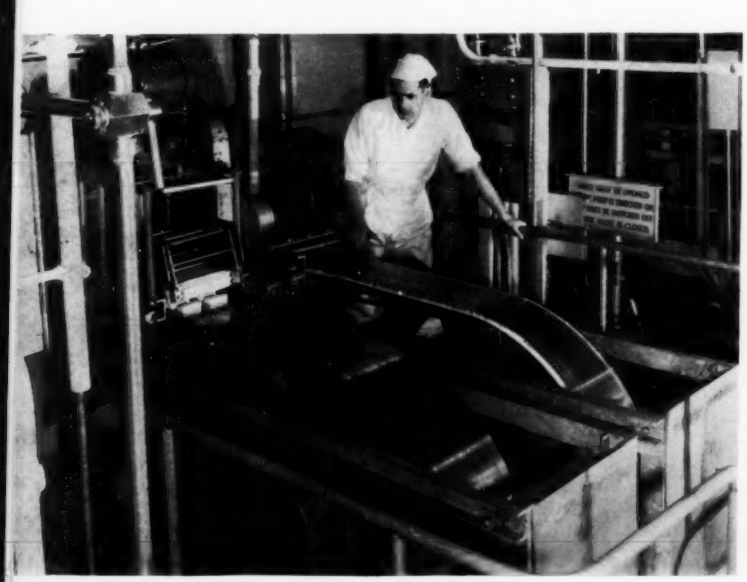
in the Ice Cream Industry

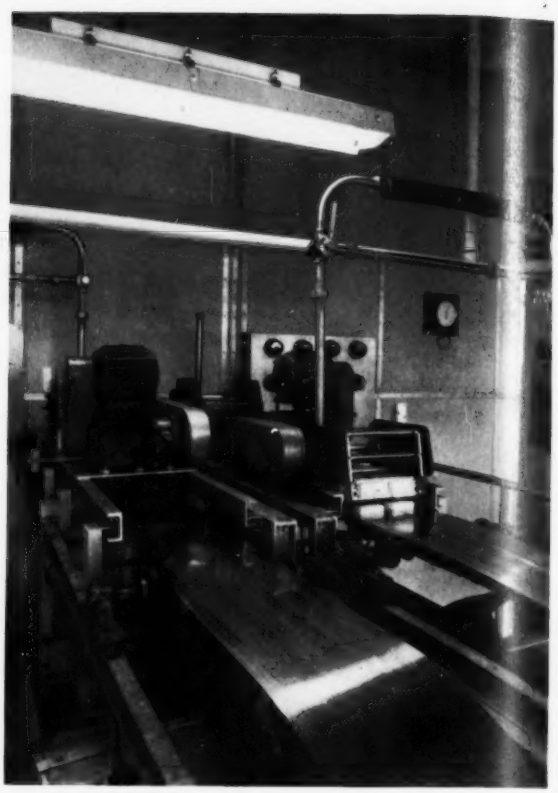
OUTPUT has been increased and labour costs reduced in several of the largest ice cream factories in Great Britain by the introduction of production processes which include the use of stainless-steel band conveyors in the hardening tunnels. Two of the firms concerned are T. Wall & Son, Ltd., and the Eldorado Ice Cream Co., Ltd., both of London.

Conveyors of this type are employed for handling the products of a variety of firms in the food industry, examples being sugar, pastries and fancy cakes, chocolates, biscuits, bread, margarine, suet, toffee, sweets, etc. Their great advantage is that, having a dense hard and smooth surface with no links or hinges to form crevices they are highly resistant to corrosion and rancidity.

Although production processing in the ice cream industry differs in matters of detail according to the type of product required, the principle of manufacture remains the same. After passing through a series of manufacturing stages, the ingredients are conveyed in the form of an emulsified mix to a cooler where the temperature is reduced by heat exchangers from 155 deg F to 38-42 deg F within 15 sec.

Extruded bar of ice cream being cut in the briquette size before passing through the hardening chamber on a Sandvik stainless-steel band conveyor





Another stainless-steel band conveyor installation used for an ice cream hardening chamber

On leaving the cooler, the mix passes into large storage vessels, where it is held ready for supplying to the freezer section. It is at this stage, at both the Walls and Eldorado factories, that the stainless-steel band conveyors come into the picture. Ice cream fed to the conveyor bands varies to suit the requirements of the particular manufacturer. In most cases, however, it is extruded through suitably shaped nozzles on to the band and carried into the hardening tunnel where the temperature is about —30 deg F, either as a continuous column or already cut into the correct lengths immediately following extrusion. As it leaves the hardening tunnel, the extruded 'bar' of hard-frozen ice cream is cut into saleable sections, which are either (*a*) fed into the wrapping section to become briquettes, or (*b*) passed through a chocolate-coating machine and thence once more through the hardening tunnel before they reach the wrapping section.

Wrapped bars and briquettes are then bulk packaged and taken by conveyor belt into the main refrigerator for storage at —20 deg F.

Eldorado are at present using nine stainless-steel band conveyors, each 112 ft long; Walls have 16 160-ft conveyors with a further eight conveyors on order for their new factory. At each factory the cleansing method is roughly the same, a daily washing with detergent followed by a rinse from a continuous spray. At Walls, the conveyors are normally in use over two 9-hr shifts; at Eldorado they are running 12 hr/day.

Both companies speak highly of the benefits which have resulted since they changed over to stainless-steel conveyors, which in both cases were supplied by Sandvik Steel Band Conveyors, Ltd.

SPECIAL VEHICLES FOR MATERIALS HANDLING

THEIR USE BY THE SOUTHERN GAS BOARD

by H. M. Lawrence, M.A., M.I.Mech.E., A.M.Inst.Gas E.

EFFICIENT, safe and speedy transport of commodities forms an integral part of materials handling practice. To many people the words 'materials handling' conjure up a picture of possibly a fork lift truck and a large stack of pallets, a flow-line conveyor system, a crane grabbing from a stock-pile or some large piece of earthmoving equipment engaged on a civil engineering project. It is suggested that very rarely do these words conjure up pictures of the very large number of commercial vehicles operated nowadays which are, in fact, an essential part of materials handling.

It is common to find in a well-organized outfit with up-to-date stores buildings, despatch department, internal conveyor systems and efficient palletization, designed and built to speed the flow of goods through the factory with the minimum of double handling and without damage, that the end-product finishes up on the loading dock to be placed on an oddly assorted fleet of vehicles—lorries of the wrong type, i.e. wrong height on the platform, wrong width of body, and either of inadequate or surplus capacity. In such organizations there is often no one person of sufficient standing to oversee the general handling of materials, including the transport function.

When the Southern Gas Board was reorganized some three years ago, a new department was formed to deal with materials handling, transport and coal. The large fleet of vehicles operated by the department is called upon to carry out a multiplicity of tasks in connection with customer service, gas distribution and gas production. These departments, which have their own functional heads, have been reorganized to meet present-day conditions, the control being centralized at Area Headquarters. This centralization of administration brought in its train many problems of transportation. It has, indeed, increased the importance of the service rendered by transport while underlining the importance of specially equipped and specially designed vehicles.

The Materials Handling, Transport and Coal Department maintains close relationships with the various manufacturers, together with the manufacturers of ancillary equipment and the retail motor trade, and has been responsible for the development of several original ideas for vehicle design which might be of interest.

Close liaison between manufacturers and fleet operators is necessary to satisfy the large number of specialized demands. There are indeed many factors when considering the design of special-purpose vehicles.

The tendency in the pursuit of economy to purchase vehicles of insufficient capacity and subject them to overloading must be resisted. From the safety angle alone one should have no qualms regarding the capacity of the vehicle in doing its job.

With the advent of the motorways in this country, underpowered chassis and mediocre braking will have no

Fig. 1. Specially designed eight-wheel vehicle of 24 tons g.v.w. for the distribution of coal in bulk

place. Manufacturers are aware of this and are paying a great deal more attention to the fitting of more powerful engines, disc brakes, lower suspension and cabs that provide far greater comfort and visibility—all features necessary for safe, high-speed driving both laden and unladen.

There are many interesting questions to ask oneself. Is the engine powerful enough to deal with the maximum load and yet sufficiently flexible for congested traffic conditions and light loading? Is it to be diesel or petrol? Do we need a four-speed gearbox, double reduction boxes, double reduction hubs, or two-speed rear axles? What about the rear axle ratio? How far do we run loaded to capacity? Does the load taper off progressively during the journey? Do we have to undertake long journeys empty? Again, do we have to pull a trailer and in this connection do we consider articulated vehicles? All these things must be taken into account before we even get to the stage of chassis length and body design.

The brakes must be carefully considered. They must be sufficiently powerful to retard a fully laden vehicle and yet not so rough in application when the vehicle is lightly loaded to endanger the vehicle or load.

Is the hydraulic system of sufficient capacity to accommodate a further axle? Is the brake exhauster of sufficient capacity?

The suspension must be looked at. Again we have similar considerations to those given to the brakes, in that the suspension must serve all the needs from maximum load to no-load conditions, from main road conditions to side roads with rough surfaces.

There are severe limitations in the normal design of leaf springs, particularly for delicate and valuable loads, and as an experiment a vehicle has been fitted with the Laminaire system on the rear axle, i.e. the leaf spring fixed only at one end and the other supported on another spring, so as to vary the effective length of the main spring proportionally to the loading. The same considerations apply to the new system of rubber or pneumatic springing.

It is important that the development of automatic transmission be pushed ahead. The swifter, more certain changes of automatic boxes alone are specially important to drivers of heavily laden vehicles and are a useful contribution to increased speed of working as well as to the reduction of stress on the transmission parts.

The types of demand on transport in the gas industry are very varied and change with the seasons and sometimes even from week to week. They cannot always be satisfied

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Fig. 2. Six-wheeled Leyland Comet with third axle fitted and chassis reinforced

Fig. 3. High-capacity tipper based upon the 7-ton Ford Trader

by production vehicles off the peg. For these reasons attention to special multi-purpose bodywork is well worth while, so as to combine good working conditions for the drivers, convenience of handling particular loads and durability in arduous conditions of service. With regard to the first of these considerations, it is well known that commercial vehicles are involved in many more accidents when reversing than any other type of vehicle. This is not altogether surprising when consideration is given to the imperfect rearward visibility of many designs. Cabs generally have improved during the last few years and larger areas of glass used both at the front and the rear. The fact remains, however, that the driver must rely upon his mirrors for rearward vision to a great extent. In this connection the largest possible mirrors should be used and the underfloor type, suitably positioned, is a useful aid.

For many years now the S.G.B. has fitted large observation windows in the side and front panels so that the driver has adequate view of the kerb each side, against the danger of children playing and of articles parked against the kerb.

Bodies can be designed to be easily detachable from the chassis, so that where summer work is completely different from winter, the correct box bodies for summer work on deliveries change over to flat platforms for coke deliveries in the winter.

The largest tonnage moved in the Southern Gas Board area is that of coal, from which the gas is made. The Board has its own deep-water berths at Portsmouth, Southampton and Poole, to which coal is brought in 2,000/3,000-ton ships from the North-East Coast. A large

Fig. 4. Dual-purpose tipper-cum-platform vehicle

4

tonnage of this coal is distributed in bulk in a fleet of specially designed eight-wheel vehicles of 24 tons g.v.w. as shown in Fig. 1. Note large volume of coal from one load.

In order to haul the maximum loads, the chassis was stripped of all non-essentials consistent with safety in operation: the bodies were built of aluminium alloy up to the maximum permissible dimensions. The resulting 27-yd bodies weigh less than 1 ton, or less than 100 lb per cubic yard capacity. At any time when they are not running on coal, these vehicles are used for the bulk delivery of coke which is a lighter material and here the advantages of the very largest capacity are even more marked.

A six-wheeled Leyland Comet recently put into service with a third axle fitted and the chassis reinforced by Messrs. J. H. Sparshatt & Sons (Southampton), Ltd., is shown in Fig. 2. The conversion added about 14 cwt to the unladen weight of the chassis. An Eaton-Hendrickson RS.320 trailing-axle was used. Rubber suspension affords a high degree of articulation. Chassis-strengthening plates are fitted to each longitudinal frame member with flitch plates carrying the torsion-rod brackets.

To carry 12-ton loads of either coal or coke in bulk, a light alloy body 18 ft long, 8 ft wide and 6 ft 6 in high is employed. A special feature of the body is the loading line door on each side to limit the capacity when carrying materials heavier than coke.

This vehicle has had a 'Hydrovac' unit incorporated in the braking system and is also fitted with a Clayton Dewandre exhaust brake to allow for the extra loading permissible on three axles.

Another high-capacity tipper (Fig. 3) is based upon the 7-ton Ford Trader. The chassis of a normal 7-ton tipper was lengthened and strengthened to accommodate a third axle manufactured by County Commercial Cars, Ltd., and fitted with a 17 ft long, 6 ft 11 in wide and 5 ft 9 in high light alloy body capable of carrying a load of 10 tons of coke.

As with the Leyland, an inspection door was incorporated on each side of the body to enable the driver to check the levels. The unusually low centre of gravity of the body was obtained by mounting the rear tipping trunnions on outrigger brackets fabricated for the purpose and bolted outside the chassis members. This also ensures continuous contact between the body sub-frame and chassis members. The vehicle is fitted with a Ford six-cylinder diesel engine and Edbro 4 LNS power-operated twin front-end tipping gear.

Fig. 7. Multi-purpose vehicle mounted on a Dennis 5-ton long-wheelbase chassis

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Fig. 5. Dual-purpose vehicle based on the Ford 5-ton L.W.B. chassis, having detachable sides

Fig. 6. The same vehicle as in Fig. 5, but equipped with stanchions and chains

Fig. 4 illustrates a dual-purpose tipper-cum-platform vehicle.

This can be used with 18-in high sides or fitted with a further extension of 18 in to 3 ft. This vehicle was based on the standard chassis of 13 ft 4 in wheelbase and was shortened to 12 ft 6 in to satisfy a much wanted need for a high-capacity tipper of forward control design and minimum wheelbase. This type of vehicle was not at that time produced by any manufacturer.

Figs. 5 and 6 illustrate another dual-purpose vehicle based on the Ford 5-ton L.W.B. chassis, having detachable

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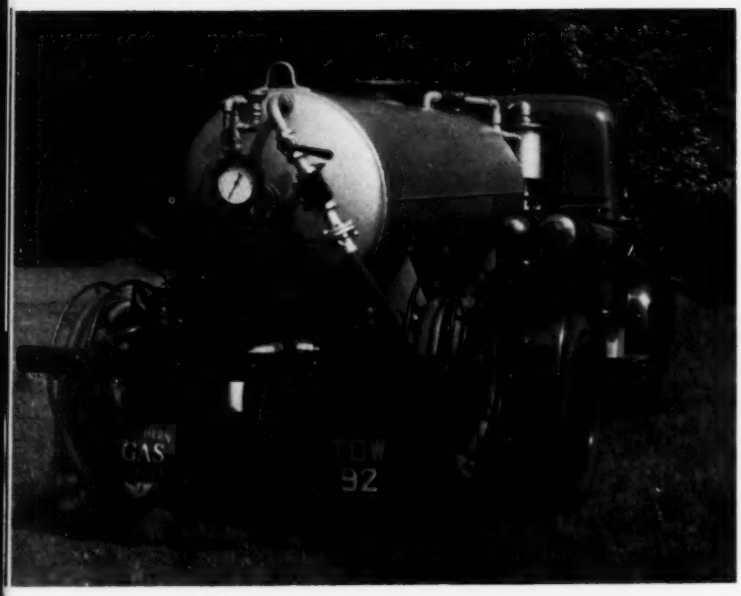

Fig. 8. Special tankers for pumping highly inflammable condensate

sides for conveyance of special materials and equipped with stanchions and chains for the carriage of sacked coke. The standard chassis was fitted with a special light alloy body with a hardwood floor. The floor slopes 1 in towards the centre to ensure safe stacking of coke sacks and drainage slots are incorporated.

A further development (Fig. 7) is a multi-purpose Dennis 5-ton long wheelbase chassis. Here the body can be a covered van by mounting the solid tilt on special running rails on the top of the body sides. By removing these it can be a bulk tipper or a flat platform with stanchions and chains.

Fig. 8 illustrates a tanker employed in pumping highly inflammable condensate from the gas main connecting the Esso Refinery at Fawley with the Southampton Gas Works. The problem confronting the S.G.B. was the removal from this main of unknown quantities of condensate. This condensate, which was expected to settle in 15 siphon pots along the main, is petroleum spirit within the meaning of the Act, having a flashpoint below 73 deg F. It appeared likely that the condensate would contain a high proportion of water and also butane and pentane.

The pressure in the main would vary between 10-15 lb/sq. in. and consequently the tanker would be loaded by means of this pressure. It was, therefore, evident that not only would the tanker have to comply with the Petroleum Spirit Regulations, but the tank itself should comply with the Pressure Vessel Regulations and would be within the purview of the Factories Act.

The unloading of the tanker would have to be carried out at the refinery, where the condensate would be discharged into a 'slops' sphere which, for reasons of safety, has to be maintained under pressure. The means adopted for this operation was the introduction above the condensate of an inert gas, in this case nitrogen, carried in four bottles, at a pressure of 25 lb/sq. in. Nitrogen was selected in preference to CO_2 on account of the water content of the condensate, since CO_2 is soluble in water. It was considered desirable to maintain a blanket of nitrogen on top of the condensate and, furthermore, that a quantity of condensate be maintained after unloading to keep the dip pipe sealed. A Simmonds contents gauge was adopted to ensure this condition being met. The quantity of condensate left in the bottom also affords some protection to the float of the Simmonds gauge.

These complications resulted in discussions with the Explosives Branch of the Home Office and also the insurance company responsible for carrying out inspections of pressure vessels for the Gas Board.

From previous experience of siphon pumping, estimates were made of the quantities of condensate to be handled and it was finally decided that a tank of some 350 gal capacity would be necessary. The vehicle selected for this job was the Ford 4D 3-ton chassis and the tank size ultimately adopted was 8 ft long and 3 ft in diameter. Although the pressure in the main was estimated to be 10-15 lb, it appeared desirable to design for a much higher pressure and 35 lb/sq. in. was considered to be the maximum attainable. The tank design was based on this pressure and it was specified that a hydraulic pressure of 80 lb/sq. in. had to be sustained.

The construction of the vehicle was entrusted to Allan Taylor (Engineers), Ltd., the tank itself being manufactured by Frederick Braby & Co., Ltd., under the supervision of the insurance company's inspector. The specification for the tank called for radiographing of all welding, readily removable baffle plates, compensated manholes to permit of easy inspection and provision for de-sludging and flushing out.

So far as the vehicle was concerned, the chassis was modified and double-pole wiring incorporated. A readily accessible master switch was also incorporated to permit of easy isolation of the electrical system, a fire shield was fitted and the rear windows of the cab constructed of wired glass and inserted in fireproof fittings. The exhaust system was brought to the front of the vehicle, terminating in a water-sealed spark arrestor. This particular piece of equipment was specified by the Esso Petroleum Company in view of the fact that the tanker was required to operate in dangerous areas at the refinery.

The rear twin tyre equipment was considered to be a source of possible danger due to friction and 750 × 20 single tyres of anti-static type were adopted. In this connection special propane hoses, earth bonded, were employed.

Fig. 9. Four-wheel drive tanker used for spraying gas liquor on farmland

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Fig. 10. Appliance delivery van based on Austin 4-ton L.W.B. forward control van

Fig. 11. Interior of van shown in Fig. 10

Fig. 12. Edbro hydraulically lifted tailboard, used with the appliance delivery van

and a special drill was worked out to ensure continuity prior to loading or unloading. The tanker was put to work and proved to be quite successful, but it was found in practice that the amount of condensate was less than expected and resulted in only intermittent working on this main.

The Gas Board's normal siphon pumping tanker fleet engaged on siphon clearance on district mains was working to capacity, and it was then decided to modify the Fawley main tanker so that it could fulfil a dual roll, i.e. Fawley main and district siphons.

The method adopted on district siphons is to load the tank by means of vacuum and discharge by gravity, the vacuum in the tank being created by a small auxiliary engine-driven exhauster unit. A Lister diesel engine was selected for the job and was accommodated between the cab and the tank, the latter being re-positioned to the rear to provide the necessary clearance, and the exhaust from this auxiliary engine was arranged to terminate in front of the cab fire-screen. Various additional connections were made to the tank and a special valve incorporated to prevent liquor from the tank entering the exhauster.

The operators/drivers have been specially trained in this work and the drill worked out originally has now been extended to cover the dual purpose. The various connections on the tank are suitably interlocked to prevent mishandling, and a colour code adopted in respect of those valves to be manually operated for either duty.

The hoses are carried in specially constructed reels at the rear of the vehicle in a convenient position for handling and it will be observed from the photographs that the top of the tank is clear of any projections, this latter point being very important in the event of a capsize.

Nitrogen bottles are mounted on the offside of the vehicle and connected to a manifold positioned on the front tank panel. The vehicle is finished in Southern Gas Board livery, but the tank itself is painted aluminium with a view to minimizing heat absorption.

To ensure the safety of personnel operating this vehicle, very strict working instructions in a particular sequence have been issued both for emptying siphons on the Fawley main and for district siphon working.

In 1950 the application of gas liquor directly from works to farmland was developed in the Southern Gas Board area and after experience had been gained, a special four-wheel drive tanker was evolved (Fig. 9).

Figs. 10 and 11 illustrate an appliance delivery van based on the Austin 4-ton L.W.B. forward control van with a 3·4-litre diesel engine. The special body and cab built by King & Taylor, Ltd., of Godalming contains the following features:—

1. Easi-Access fibreglass cab with square hinged-type roof vent, two roof lamps, log book holder, flat writing platform on bonnet cover and cab heater.
2. Light alloy body with wood floor and full width 2 ft 6 in drop well at rear.
3. Full-length tunnel from front bulkhead to front of drop well for pipe carrying.
4. 3 ft 6 in wide roller shutters situated 2 ft from n/s front and 5 ft 6 in from o/s front of body.
5. 4 ft 6 in wide roller shutter at rear.
6. One-piece translucent glass fibre moulded dome roof.
7. Interior of body slatted with light alloy slats and fitted with a Dexion rail along each side and across front end at a height of 28 in. Expanding rubber cords are used to secure

Fig. 13. Cycle-carrying vehicle designed for accommodating slot meter collectors and their cycles

Fig. 14. Interior of mobile store van

Fig. 15. Mobile showroom on a Karrier Bantam tractor unit

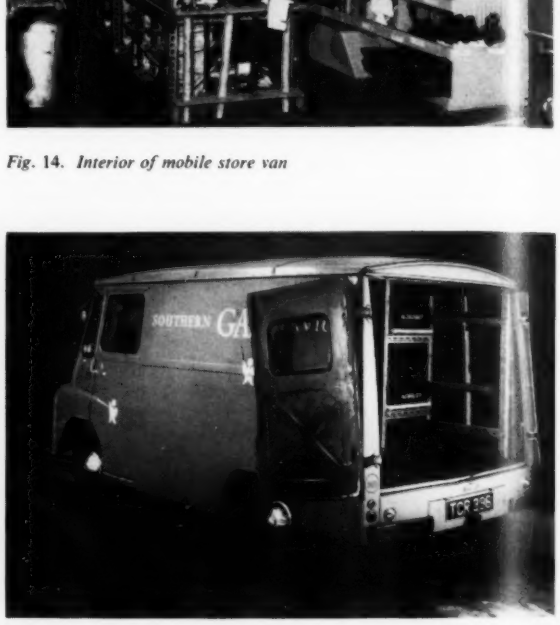

Fig. 16. 1-ton B.M.C. van fitted with racks and shelves for collecting laboratory samples

appliances to this rail. Four interior lamps are fitted, one in each top corner.

The later development of this special-purpose body incorporates an Edbro hydraulically lifted tailboard, of which the oil motor, gearbox and universal joint can be seen in Fig. 12. The construction by J. H. Sparshatt & Sons, Ltd., is worthy of note because it comprises aluminium alloy tubing welded by Argonarc into aluminium blocks and covered by special section fibreglass formers.

Fig. 13 illustrates a cycle-carrying vehicle designed by the M.T.C. Department and introduced by the Board for carrying slot meter collectors and their cycles to increase efficiency and speed of collection, and to save collectors from excess pedalling and long exposure to adverse weather. The vehicle is fitted with office equipment and crew space behind the driver, with provision for six cycles in a special floor under the tilt cover. The vehicle was based upon the Austin A.152 15-cwt Omnitruck and the bodywork carried out by E. G. Freeman.

To reduce gas fitters' time in having to return to the depot for urgently required spare parts, several B.M.C. 30-cwt diesel vans have been specially equipped as mobile stores (Fig. 14). Driven by supervisors, these vans rendezvous with fitters at pre-arranged times and places, and supply them with any additional parts that they require. These vans have proved extremely useful, again in outlying areas where the fitter is working a long way from the depot, and where the material and appliance have been delivered in advance.

To give greater service to customers in outlying areas, it was decided to construct 11 mobile showrooms (Fig. 15). The Karrier Bantam tractor unit with diesel engine was selected and showroom bodies were constructed on articulated trailers. Each showroom has large side windows, an entrance at nearside centre and, besides being equipped with displays of the latest appliances, has fluorescent lighting, a live gas supply and a section where customers may settle accounts.

Heavy-duty electrical equipment has been fitted to each showroom for the operation of a VHF radio transmitter/receiver, which enables immediate contact to be made with base.

A standard 1-ton B.M.C. van has been fitted with special racks and shelves, etc. (Fig. 16), and is used to collect laboratory samples from the various gas works each day. These samples are taken to the Central Laboratory at Poole Works and, on average, the van covers 1,000 miles per week at an average of 35 m.p.g. In addition, as the van calls at regional offices daily, it is also used for the conveyance of parcels, spares and fuel pumps and injectors which are overhauled in our own fuel injection shop at Bournemouth.

HEAVY-DUTY SIDE-OPERATING FORK LIFT TRANSPORTERS

ALTHOUGH IT IS commonly known that Otis Elevator Company, with headquarters in New York, and factories and branches in most European countries and the Commonwealth, are manufacturers of lifts and elevators, the fact may not be so well known that Otis now has a separate division with a large plant at Cleveland, Ohio, U.S.A., manufacturing practically every type of industrial and fork lift trucks, including the well known 'Traveloader' heavy-duty side-operating fork lift transporters. This division formerly comprised the Baker Raulang Company.

Baker now produce some 19 different models of their petrol-powered fork trucks up to 7,000 lb capacity, some 29 different models of their battery-operated fork trucks up to 150,000 lb capacity and electric crane trucks of 6,000 lb and 10,000 lb capacity.

The most unique mechanical handling equipment manufactured by the Baker Industrial Trucks Division of Otis Elevator Company is doubtless the Traveloader range of heavy-duty side-operating fork lift transporters, diesel, petrol, and battery operated. Baker Traveloaders have created a new concept in the field of mechanized handling of long, heavy, bulky loads in confined spaces. The 'Traveloader system' makes the handling of long loads easier, faster and more economical of space and manpower by using only one machine, one operator and a limited space for the handling of loads which formerly required varied equipment, much labour, and considerable space.

The self-loading and unloading Traveloader stacks and unstacks, loads and unloads, like an orthodox fork lift truck, carries the load over all four wheels like a platform truck, and can deliver its load like a conventional road vehicle and at a similar speed. It is available in capacities from 4,000 lb to 50,000 lb.

Materials Handling Equipment (Great Britain), Ltd., introduced side-operating fork lift carriers to the United Kingdom in 1954 with the Irion side-operating carriers, since superseded by the British Kestrel side-operating carriers made at their factory at Maidenhead, Berks. In 1957, however, Materials Handling (Great Britain), Ltd., entered into an agreement with Otis Elevator Company whereby the former company was granted the exclusive franchise for the sale of Traveloaders in the United Kingdom

Fig. 1. The Traveloader Model TKF 300 of 30,000 lb capacity. Note the four diagonally extending hydraulically operated stabilizer jacks which ensure rigidity of the unit during loading and unloading operations and obviate the use of heavy balance weights which are an essential with conventional fork lift trucks during such operations

Fig. 2. Traveloader Model TKF 150 of 15,000 lb capacity handling container with heavy guided missile. This is standard equipment with the U.S. Armed Forces

and the Sole Licence under the British Patent.

Since British Kestrel carriers are manufactured with capacities of 6,600 lb and 8,800 lb it follows that Materials Handling Equipment (Great Britain), Ltd., is now in a position to offer to British industry a range of side-operating carriers and transporters of capacities up to 50,000 lb.

Experience has shown that for the timber and allied trades, side-operating carriers up to 8,800 lb capacity fulfil most requirements, but in the steel and heavy engineering industries, etc., this highly manœuvrable equipment is frequently needed in considerably greater capacities as a substitute for, or to augment the operations of, overhead gantry cranes. It is for this reason that in regard to the Traveloaders, Materials Handling Equipment (Great Britain), Ltd., intend to concentrate mainly on the units of 20,000 lb, 30,000 lb and 50,000 lb capacities.

Brief specification of the Traveloader TKF 300

Lifting capacity: 30,000 lb at 39 in load centres.
Overall length: 27 ft 3 in. Overall width: 8 ft.
Engine: Hercules diesel 132 b.h.p. at 2,400 r.p.m.
Transmission: Allison Torque converter.
Drawbar pull: 17,000 lb.
Driving speeds: Up to 20 m.p.h. forward and reverse.
Brakes 4-wheel Hydro-Vac Hydraulic.
Hydraulic system: Hydreco Gear displacement pump.
Hoist assembly: Lifting height 12 ft (standard); height from ground raised, 16 ft 6 in, lowered 10 ft 6 in. Tilt 5 deg.
Cabin: All-enclosed driver's cabin. Driver can face and operate the unit forwards or rearwards.
Lighting and Steering: 12-V Autolite in conformity with M.O.T. regulations.

An initial contract for Traveloaders Model TKF 300 has been placed by Dorman Long (Steel), Ltd., for their large modern plant at Middlesbrough.

MECHANICAL HANDLING EXHIBITION

3-13 May 1960, Earls Court, London, S.W.

OCCUPYING over 500,000 sq. ft. in London's Earls Court, the next *Mechanical Handling* Exhibition promises to be the largest and most diversified ever held. As the build-up of this great industrial exhibition progresses, many new names are appearing on the exhibitor's list, reflecting the steady growth in all branches of the mechanical handling industry since the last show in 1958. Inquiries from prospective visitors from all parts of the world indicate that buyers from over 80 countries will tour the exhibition during its 10-day run.

The exhibition, organized by **MECHANICAL HANDLING,** will be open from 10 a.m. to 6 p.m. each day from May 3rd to 13th, with the exception of Sunday, May 8th. Full information, programme of film sessions, details of travel and hotel facilities and free admission tickets can be obtained from the Organizer, Dorset House, Stamford Street, London, S.E.1, England.

Classification of Principal Exhibits at 1960 Mechanical Handling Exhibition and their Main User Industries

Equipment

Industrial Conveyors, Belt, Slat, Chain, Roller, Plate, Woven Wire and Portable.
Elevators and Stackers
Hoists and Pulley Blocks
Pneumatic Handling Plants
Grain and Powder Handling Plants
Pneumatic Tube Systems
Coal Handling Plant, Conveyors, Wagon Tipplers, Skip Hoists, Vibrators and Screening Plants.
Bottling Plants
Trucks, Fork Trucks, Industrial Trucks and Trailers, Tractors.
Aerial Ropeways, Cableways and Telphers Cranes, Derrick, Tower, Overhead, Mobile and Wall Cranes.
Earth-moving Equipment, Power Shovels, Scrapers, Bulldozers, Overloaders and Dumpers.
Lorry Loaders
Accessories and Appliances, Pallets, Stillages and Containers, Conveyor Belting, Chains, Crane Attachments, Pneumatic Equipment, Control Equipment, Conveyor Components, Driving Gears, Truck and Trolley Wheels, Bag and Sack Fillers.

Industries Covered

Raw Materials, Mines, Quarries, Collieries, Cement Works, Chemical Products.

Raw Material Processing, Iron and Steel Works, Metal Refiners, Foundries, Paper, Textile and Timber Mills, Oil Refineries, Tanning.

Transport, Shipping Lines, Railways, Air Lines and Road Hauliers, Docks, Wharves and Warehouses.

Agriculture, Millers, Fruit, Sugar Beet and Root Crop Growers, Fertilizers.

Civil Engineering, Building, Public Works Contractors, Constructional Engineers.

Heavy Engineering, Shipbuilders, Marine Engineers, Boiler Tube and Tank Makers, Electrical Plant Manufacturers.

General Industrial, Sugar Refiners, Foodstuffs, Manufacturing Confectioners, Manufacturing Chemists, Rubber Manufacturers, Breweries, Brick and Tile Manufacturers, Laundries and Dry-Cleaning, Furniture and Joinery, Cosmetics.

Production and Assembly, Aircraft and Motor Car Manufacturers, Cycle and Motor Cycle Manufacturers, Domestic Appliances, Electrical and Wireless Industries, Engineering Components, Machine Tools, Sheet Metal Fabrication.

Mechanical Handling *May special issue will contain, in addition to articles and usual features, a complete list of exhibitors, an illustrated preview of their exhibits and details of the exhibition.*

Fig. 1. General view showing loading end of Chase Stock Control System. Note rails at three levels, with provision for fourth rail when required

HEATING ENGINEERS INSTALL STOCK CONTROL SYSTEM

IT WILL BE RECALLED that at the 1958 Mechanical Handling Exhibition, a new and interesting Stock Control System incorporating first in-first out storage was displayed by P. C. & C. K. Chase, Ltd. This system is sometimes called 'live storage', yet basically it consists of rail mounted trolleys and pallets or stillages in which the stock is stored and distributed.

The rails are laid on the floor to a very slight slope to provide a trackway for the flanged wheels of the trolleys. Post pallets or other stacking containers are loaded on to the trolleys at the high end of the track, and proceed down the slope to the discharge end. As they become empty the trolleys are lifted off the track and returned to the loading end for re-use. No danger arises, on the gentle gradient to which the rails are set, of trolleys running away. Stops are provided at the lower end of the rails to prevent the trolleys running off.

The system can be adapted to suit particular requirements, and this has been done at the Colnbrook factory of Copperad, Ltd., manufacturers of heating and ventilating equipment.

In laying out their new warehouse, Copperad, Ltd., were faced with the problem of ensuring first in-first out when stocking Wallstrip and fan convectors. Their work study staff, in conjunction with P. C. & C. K. Chase, Ltd., developed a multi-tier system which solved their particular problem and proved to be a tremendous space saver into the bargain.

This system consisted of a skeleton structure, 10 ft high by 40 ft wide by 39 ft long, made of channel sections which supported 40 sets of track at four levels. Each set of track 39 ft long provided a runway for a number of platform trolleys each having four flanged wheels. Loaded trolleys, carrying a payload up to 1,000 lb, were inserted at the loading end and travelled down a slight incline to the unloading end of the track, a gentle push being sufficient motive power. One part-time fork lift truck and a simple trolley loader were the only other items of equipment needed.

Application

Wallstrip—These items had five variations of length, from 3 ft 3 in to 8 ft 3 in with height and width constant at 3 in and 10½ in respectively. In order to standardize on

Fig. 2. Loaded stock trolley being transferred to its appropriate section

Fig. 3. Trolley loader being wheeled into position with Wallstrip stock for lower set of rails

track and trolley widths and to provide a stable load it was decided to take up the product length variation in the track length which was calculated to give from four loads per track at 8 ft 3 in to 12 loads at 3 ft 3 in. In order to reduce the variety of trolley lengths only two sizes were used: 8 ft 6 in and 6 ft 6 in.

Wallstrip trolleys were confined to the two lower track levels for two reasons; (*a*) To enable a simple inexpensive intermediate trolley loader to be used—8 ft 6 in long loads being difficult to fork lift directly in without using enormous gangways; (*b*) Wallstrip items, though bulk loaded, were required in small quantities for despatch to individual customers.

In operation, Wallstrip units are placed on a stock trolley in the assembly shop as they are made. The completed load on its trolley is then collected by the warehouse fork lift and placed on the pre-aligned trolley loader at the rail loading end. This trolley loader serves the first two levels only and carries two sets of rail tracks which align with those in the structure. A gentle push is sufficient to transfer the loaded stock trolley to the rail tracks. The whole operation is capable of being carried out in a short space of time by the fork lift truck operator on his own.

At the unloading end, unit lengths of Wallstrip are extracted manually as required by the packing staff direct on to the packing tables. Trolleys, when empty, are easily lifted out by one man and returned to a stack at the loading end. Other trolleys on the same track are then free to roll forward to the front stops.

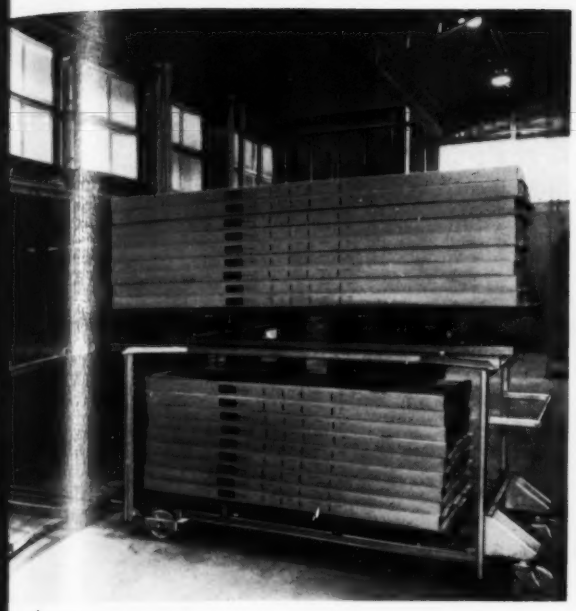

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Fig. 4. Stock trolley being placed in position by fork reach truck on trolley loader before being transferred to middle section of rails

Fig. 5. Stock being removed as required for despatch at lower end of rails

Fig. 6. Placing fan convector stock trolley on top set of rails by means of fork reach truck. Note guides on rails to assist operator

Fan Convectors—These larger products, weighing up to 300 lb, have three length variations, 3 ft 6 in, 4 ft 4 in and 5 ft 4 in and are all 15 in deep by 36 in tall.

It was decided to lay these on their backs, two per trolley, one above the other and to accommodate the length variation in the width of the structure in order to facilitate direct fork lift loading and unloading on to and off the upper two rail levels without the need for an intermediate loader.

Only two gangways were required, one at each end 9 ft 6 in wide, and it is estimated that if conventional storage methods were used, i.e. racking or stillages, at least 85 per cent more floor space would have been required to give the same access to stock, without the benefits of enforcing first in-first out.

Installation

Dimensions:

Length 39 ft, Width 38 ft 5 in = 1,460 sq. ft.
Height to top of stock 12 ft 7 in.
2 access gangways 9 ft 6 in wide × 38 ft 5 in long.

Stock holding capacity:

Wallstrip, 4 weeks.
Fan convectors, 4 weeks.
Longest item held is 8 ft 3 in Wallstrip lengths.

The detail design drawings and the manufacture and erection of this storage system were completed in a very short space of time by P. C. & C. K. Chase, Ltd., in order to have the completed layout working for the opening of the new Copperad warehouse of 20,000 sq. ft. which was built and in use six weeks from the cutting of the first sod.

Advantages

The major advantages to be obtained from the use of this installation are as follows:—

Space saving through reduction of gangways.
Guaranteed rotation of stock.
Convenient location of each stock item.
Simplicity of stock taking.
Negligible maintenance of installation.
Reduction in mechanical handling operating costs.
Adaptability to suit pre-determined unit loads.
No restrictions on size or throughput.

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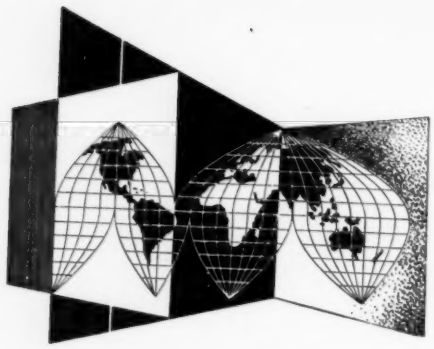
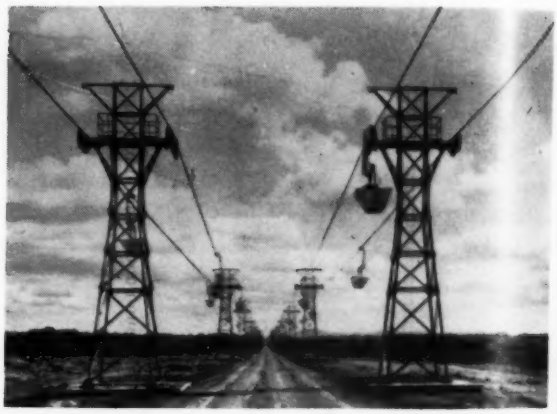


BRITISH MECHANICAL HANDLING EQUIPMENT OVERSEAS

FINLAND. *Handling cheeses in a warehouse of the Port of Helsinki is this Conveyancer E2-20 battery fork truck with a capacity of 2,000 lb at 20 in load centre*



NEW ZEALAND. *This twin aerial ropeway installation by Ropeways, Ltd., is working on the monocable system, handling coal at the rate of 300 tons/hr. The installation was recently completed for the Government of New Zealand*

TRINIDAD. *This International Drott Skid shovel was used in the construction of Trinidad's new fly-over bridge recently completed. The structure has a 460 ft span supported by five piers. The carriageway is 28 ft wide with two 5 ft pavements*

British mechanical handling equipment is to be found working in most countries of the world. Each year since the end of the war, sales to overseas customers have increased. Buyers from overseas flock to the Mechanical Handling Exhibitions (organized by this journal) held every two years in London, so great is the regard for British equipment.

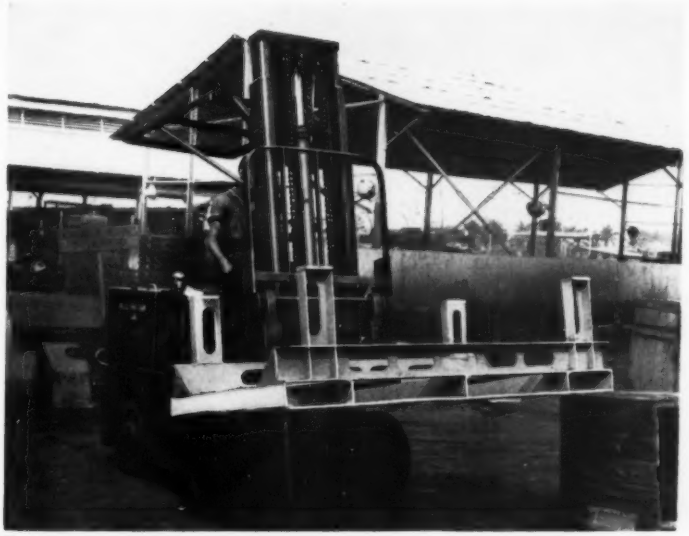
In this feature, to be continued each month, we shall bring you brief details and illustrations of such British equipment designed for, or at work in, countries abroad.

Overseas readers requiring information on any type of British mechanical handling equipment, or names of manufacturers' agents or representatives in a particular country, are invited to write to the Editor.

Britische Förder- und Hebegeräte befinden sich in den meisten Ländern der Erde im Einsatz. Seit Kriegsende steigern sich die Verkaufsziffern an ausländische Abnehmer von Jahr zu Jahr. Ein so grosses Ansehen geniessen Geräte britischer Herstellung, dass ausländische Käufer anlässlich der alle zwei Jahre von dieser Zeitschrift in London veranstalteten förder- und hebetechnischen Ausstellungen in Strömen herbeikommen.

In dieser monatlich fortgesetzten Artikelserie werden wir kurzgefasste Einzelheiten und Abbildungen britischer Geräte bringen, welche für das Ausland konstruiert bzw. dort bereits im Einsatz sind.

Ausländische Leser, welche an Auskünften über britische Förder- und Hebegeräte gleichwelcher Art, bzw. an Namen und Adressen der entsprechenden Hersteller, Agenten und Vertreter in irgend einem gegebenen Lande interessiert sind, werden gebeten, sich schriftlich an die Redaktion zu wenden.



VENEZUELA. *A Ransomes fork lift truck, fitted with special clamp working at the Shell Petroleum Co.'s works at Laguinillas, Venezuela*

En la mayoría de os países del mundo puede hallarse funcionando equipo británico de manejo mecánico. Desde que terminó la guerra la venta de tal equipo a los compradores de ultramar ha venido aumentando sin cesar. Tan considerable es la estima en que se el equipo de fabricacion britanica en todo el mundo, que son numerosísimos los compradores extranjeros que se personan en Londres para visitar la Exposición de Manejo Mecánico (organizada por esta Revista) que se celebra cada dos años.

En esta sección, que aparecará todos los meses, les ofreceremos ligeros detalle e illustraciones de tal equipo británico diseñado para países extranjeros o funcionando en ellos.

Los lectores de ultramar que requiran información sobre cualquier equipo británico de manejo mecánico, o el nombre del agente o representante de los fabricantes en cualquier país en particular pueden escribir pidiéndola al Director de esta Revista.

CANADA. *A Coles crane, model S1210c, fitted with a 20-ft cantilever jib, handling wire coils at the Montreal premises of the Steel Company of Canada. Ltd. This crane is in use from 16 to 24 hours each day, six days per week.*

Le matériel britannique de manutention mécanique se trouve en service dans la plupart des pays du monde. Chaque année, depuis la fin de la guerre, le chiffre des ventes à la clientèle des pays d'outremer s'est accru. Des acheteurs de tous les pays du monde accourent aux Expositions de la Manutention Mécanique (organisées par notre publication), qui ont lieu tous les deux ans à Londres, si haute est l'estime que l'on a pour le matériel de fabrication anglaise.

Dans cet article, à suivre tous le mois, nous vous présenterons des détails succincts et des illustrations du matériel anglais spécialement étudié pour et mis en service dans les pays étrangers.

Nous invitons cordialement les lecteurs de l'étranger à écrire à notre Rédacteur en Chef (The Editor) pous tous renseigements concernant un type quelconque de matériel anglais de manutention mécanique, ou les noms de fabricants, agents distributeurs ou représentants dans un pays donné.

HOLLAND. *Two Rapier Super fork trucks carrying timber in the docks at Rotterdam*

CRANE FOR CONTAINER HANDLING

Fig. 1. The new container handling crane seen slewing before placing its load on to a semi-trailer

EFFICIENT transport has been one of the key factors in the development of industry in Northern Ireland. The important thing has been and always will be speed, for if Northern Ireland is to compete with industry in other parts of Britain, then raw materials and the finished products must be moved rapidly in both directions between Northern Ireland and England, Scotland and Wales. One of the answers to this problem was found to be Anglo-Continental Container Services, Ltd. This transport service has developed rapidly in the past 11 years and the development recently brought about a mechanical handling problem for A.C.C.S.

They use four ships, some with a capacity of 38 containers. High-speed, fixed handling equipment at the ports load and unload the vessels to meet time schedules brought about by tidal and other maritime considerations. If congestion at the quaysides was to be avoided, however, then mobile handling equipment had to be found which would move the containers swiftly and without damage to their cargo from the quay to a container park, where the road haulage vehicles which carry them are loaded and unloaded. Another important condition which this equipment had to meet was that it had to work in narrow aisles so that the full capacity of the park was used. What was needed was a piece of equipment which could work in a narrow aisle, could slew through 360 deg, handle 20-ft long 12½-ton containers, hold a load firmly so it does not swing, travel and manœuvre at a reasonable speed when fully loaded, keep the container almost vertical and, at the same time, lift the load clear of other containers and transport vehicles.

Fig. 2. Placing a container on the ground

The answer was a specially designed Coles 'Emperor' crane. The outstanding design feature on this crane being the lifting gear. Instead of a normal strut-type jib this crane is fitted with a special lifting mast made from rolled steel sections and plates in the shape of a 'T' or 'hammer-head'; and hinged at its lower end in support brackets at the front of the superstructure. A fabricated steel container carriage projects horizontally from the mast and is raised by means of the hoist rope which passes over pulleys on the cross piece of the 'T'-shaped mast and is attached centrally to the carriage or frame. Four steel rollers on the carriage run in the main vertical channel of the mast which acts as a restraining guide-way and permits a smooth hoisting and lowering action. Tilting the mast a few degrees so that the load rests against a pad has eliminated swinging and prevents damage to the container. Hydraulically operated telescopic backstops prevent the mast being tilted more than 7½ deg beyond the vertical position.

A feature which allows the crane to work in a narrow aisle is its short tail radius and ability of the tail to pass over the empty trailer when slewing. The result is valuable saving in aisle width and it also means that the crane can slew, before the trailer is driven away.

The crane is powered by diesel-electric transmission. This comprises a diesel power unit directly coupled to a

(*continued on page* 233)

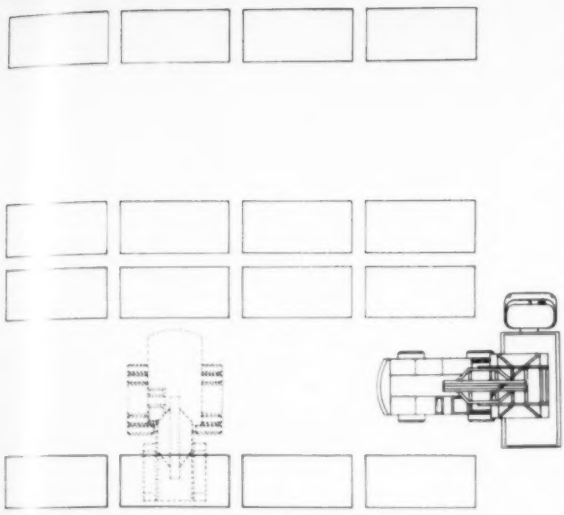


Fig. 3. Plan of a container park showing handling procedure with the container handling crane

variable-voltage generator which supplies current to the separate motors of the hoist, derrick, slew and travel units. Maximum lifting capacity, which is based on two-thirds of the tipping load, is 12½ long tons at a radius of 11 ft 3 in at which the lifting mast is in the vertical position required for normal operation.

The enclosed driver's cab is at the front of the revolving superstructure and gives an unrestricted view of the working area. All crane motions are operated from this cab and the layout of controls is carefully arranged to give swift and effortless operation. A lever for each motion is incorporated in a console in front of the driver and to operate any motion he selects the appropriate switch and moves it up or down, depending upon the direction required. Speed of motion is thereafter controlled by use of the diesel engine accelerator. The electrical control contactors are housed in a fabricated steel housing situated in an accessible position at the base of the superstructure.

The chassis is specially designed for crane duties and fabricated from steel sections and plates. Chassis travelling is powered by a 34-h.p. electric motor via a gearbox and rear axle differential. The front axle is a steel beam with the stub axles swivelling on case-hardened nickel steel king-pins carried in bronze bushes. 14.00 × 20 pneumatic tyres are fitted to pressed steel discs with twins at both front and rear. The superstructure revolves on a large-diameter double ring of steel balls running in hardened races. This double race ball bearing obviates the need for a centre post and distributes the load evenly over the chassis frame.

To ensure completely safe operation several devices are incorporated in the design. An automatic safe load indicator weighs the load and gives the operator audible and visual warning signals when attempts are made to lift an unsafe load and halts the motion if the warnings are ignored. Electro-mechanical brakes fitted to the hoist, derrick and slew units are automatically applied if there is a break in the current, either accidental or intentional; automatically self-resetting limit switches prevent hoisting and tilting beyond limit. Foot-operated air brakes act on all wheels and for parking a mechanical hand brake is used.

This type of crane has been installed at Ardrossan in Scotland and at Larne in Northern Ireland and has substantially increased the tempo at both places.

Fig. 4. Close-up of the special lifting mast and container carriage showing clearly the four lifting points

Fig. 5. The crane demonstrates its ability to lift its load clear of obstacles

NEWS OF PERSONALITIES

J. S. Bright, who joined C.A.V., Ltd., last year from F. Perkins (Canada), Ltd., has been appointed service manager of the company. In his new appointment he will be responsible for control and co-ordination of all aspects of C.A.V. service at home and overseas.

C. W. Billington will continue as service manager for the U.K. and will be responsible to Mr. J. S. Bright.

J. S. Bright

Chaseside Engineering Co., Ltd., announce the appointment of **S. J. Burton** as export sales manager. Mr. S. J. Burton, who before this appointment was an export assistant at the Hertford works, previously spent a number of years as technical sales representative for the company, during which time he made several trips overseas.

S. J. Burton

H. F. H. Shields, O.B.E.

W. H. Haugh has been appointed manager of the Glasgow branch office of Renold Chains, Ltd., 26 Blythswood Square, Manchester. He succeeds **S. H. Foster,** who has taken up other duties at Renold House, Manchester.

The Highfield Gear & Engineering Co., Ltd., announce that **W. R. Dearden, A.M.I.Mech.E.,** has been appointed southern area manager.

J. P. Barrie, who is an Associate Member of the Institute of Materials Handling, has been appointed traffic manager to Messrs. Williams & Williams, Ltd., Chester. He will be responsible for transport, export and packaging for the factories in the Chester area.

H. F. H. Shields, O.B.E., has, on completion of 50 years' continuous service with the Mechanical Handling Companies of the Glover Group, accepted the position of honorary President of British Ropeway Engineering Co., Ltd.,

M. Clayton

G. B. F. Harvey

relinquishing his chairmanship of that company to **G. B. F. Harvey,** one of the joint managing directors. At the same time he has also relinquished the managing directorship of Drag Scraper & Conveyor Co., Ltd., to which position **M. Clayton** has been appointed. Mr. Clayton is also technical and joint managing director of British Ropeway Engineering Co., Ltd.

R. N. Millar, a director of The General Electric Co., Ltd., has been appointed managing director of the company's Engineering Group which has its main works at Erith, Kent, and Witton, Birmingham.

He will have overall responsibility for the whole of the company's activities in the heavy electrical, mechanical and nuclear engineering fields.

R. S. Odd has been appointed joint managing director of Lansing Bagnall, Ltd. He is leaving his appointment as director and general manager of Wilmot Breeden, Ltd., to take up his new post from April 1st.

Mr. Odd's new appointment emphasizes the rapid progress which Lansing Bagnall is making. He will work alongside **J. R. V. Dolphin,** the other joint managing director, who two months ago joined Lansing Bagnall from Harwell, where he was engineer-in-chief of the Research Group of the United Kingdom Atomic Energy Authority.

Following this new appointment the Board of Lansing Bagnall will be as follows: **V. A. G. Lambert,** chairman; **E. Kaye** and **J. R. Sharp,** joint governing directors; J. R. V. Dolphin and R. S. Odd, joint managing directors.

In addition there are now four associate directors of Lansing Bagnall—**J. B. Peat,** secretary, **A. R. Wright, R. G. Winton** and **H. P. Mott.**

Lansing Bagnall announced that it has ordered another new factory to be built alongside the present works at Basingstoke. This factory has been made necessary to meet increased production plans, consequent upon the growing demand throughout the world for the company's products.

F. Perkins, Ltd., the Peterborough diesel engine manufacturer, announces that it has formed an overseas

(*Continued on page* 235)

R. S. Odd

K. E. Woollatt

manufacturing operations division to investigate, organize and give advice on overseas manufacturing projects.

Head of the new division—it will include the company's overseas manufacturing department—is **K. E. Woollatt,** 49-year-old director of administration, who now becomes director of overseas manufacturing operations.

Mr. Woollatt will assume overall responsibility for selected overseas manufacturing projects and will be directly responsible to **M. I. Prichard,** F. Perkins, Ltd., managing director.

Richard Sutcliffe, Ltd., of Horbury, announce the appointment of **Matthew Reid Moore** as general sales manager.

Born at Boldon (Co. Durham) in 1914, Mr. Moore received his training with the Harton Coal Co., Ltd., South Shields. After service with the Coldstream Guards during the last war, he joined Richard Sutcliffe, and for ten years was the company's district technical manager for the Northern (N. & C.) and Durham Divisions of the National Coal Board and industrial representative for the north of England.

In September, 1959, he was appointed manager of the mining and general products division. Mr. Moore will now control all the company's sales activities both mining and industrial. The appointment is effective from March 1st last.

Recently leaving this country for a further business trip to the United States and Canada were **C. W. Sharp,** managing director, and **L. Rumley,** sales director, of

L. Rumley

(left) C. W. Sharp

Conveyancer Fork Trucks, Ltd., and Electro-Hydraulics, Ltd., Warrington (Members of the Owen Organization).

BTR Industries, Ltd., announce that **Sir Walter Worboys** has been elected to the Board and appointed a deputy chairman.

Fisher & Ludlow, Ltd., announce several appointments following the resignation of Mr. C. A. Remfry (as reported in *Mechanical Handling*, March issue). **Mr. E. G. Parkes** becomes director and general manager of the Materials Handling Division; **Mr. A. E. Wood,** general works manager; and **Mr. J. F. Jones** as sales director of that Division.

Massey-Ferguson has effected a reorganization of its Engineering Division in the United Kingdom. Under the direction of **Ewen M'Ewen,** Director of Engineering, Europe, **Dr. B. F. Willetts, PhD., M.Sc., A.M.I.Mech.E., M.I.Plant.E.,** is now chief engineer, United Kingdom. After being employed at Durham University, Dr. Willetts carried out research for a number of years with Vickers-Armstrongs before joining Massey-Ferguson in the autumn of 1958.

Dr. Willetts has two assistant chief engineers, **L. E. Summerfield,** who is concerned with implements, and **H. R. Jenner,** who is concerned with combine harvesters. Mr. Summerfield, having previously worked for 13 years at Bendix, Ltd. (later Girling, Ltd.), joined Harry Ferguson, Ltd., in 1946, as a project engineer. Since then he has always been concerned with the design and development of agricultural implements and industrial equipment. Mr. Jenner joined Massey-Harris, Ltd., Toronto, in 1923. In his 37 years with the organization he has served in a variety of capacities, in Canada, Britain, France and Germany, and has travelled widely, introducing combines into Europe and Africa. Since 1948, Mr. Jenner has been responsible for combine and baler development at the plant in Kilmarnock.

P. B. Silk

P. B. Silk (Babcock & Wilcox, Ltd.) recently took up his duties as president of the Fédération Européene de la Manutention. Mr. Silk recently returned from Stockholm where he had called a meeting of the F.E.M. 'Steering Committee' to make arrangements for the Swedish National Committee for the congress which is due to be held in Sweden during the week commencing June 27th next.

Jack Lewis

Jack F. Lewis, vice-president, manufacturing, for Hyster Co., has been named managing director of Hyster, Ltd., in Scotland, according to **Philip S. Hill,** executive vice-president.

Mr. Lewis has also been elected a director of Hyster N.V., another wholly-owned Hyster subsidiary, in Nijmegen, The Netherlands. He left Portland, Oregon, with Mrs. Lewis recently to assume his new duties and residence in Scotland.

Messrs. Higgs Motors, Ltd., Witton, Birmingham, announce the appointment of **Geoffrey B. Ashton, A.M.I. Mech.E.,** as joint assistant managing director with effect from January 1st last.

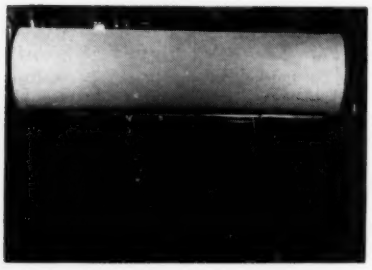
Birtley Engineering, Ltd. (Member of the B.S.A. Group), Birtley, County Durham, have appointed **E. V. Tidbury** as sales engineer for the Midlands area, based on the Birtley office at West Bars, Chesterfield. His duty in Northern England and Scotland is now covered by **T. A. Weatherspoon** (operating from Birtley) and in the Home Counties by **S. Dickinson** (operating from 54 St. James's Street, London, S.W.1).

REVIEW OF NEW EQUIPMENT

PNEUMATICALLY OPERATED TRANSFER CAR

A difficulty experienced in paper mills is the removal of a completed reel clear of the mill and at the same time to extract the heavy mandrel from the reel core. This problem has been solved at the tissue mill of Kimberly-Clark, Ltd., at Larkfield by the construction of a 4-wheeled carriage on to which the reel is rolled. One end of the mandrel is then secured and the carriage traversed sideways, thus withdrawing the paper from the mandrel. At a suitable point the carriage is stopped for further supporting of the mandrel and the paper is then finally removed.

To perform this operation, the motive



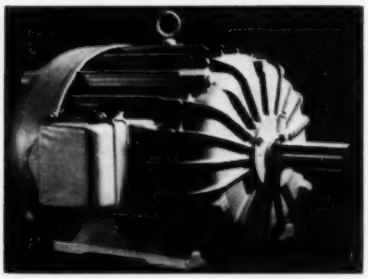
Globe pneumatically operated transfer car

power for the carriage must be capable of high initial torque to overcome friction between the mandrel and paper, must be capable of variable speed control and, finally, must be flameproof. For this application, the driving unit chosen was a 3-h.p. piston-type radial air motor manufactured by The Globe Pneumatic Engineering Co., Ltd., Ashton Road, Harold Hill, Romford, Essex, which fulfils the above requirements and, in addition, has direct reversing characteristics and cannot be damaged if accidentally stalled.

The illustration shows a reel in position on the car, with a panel removed to show the air motor in position. Power is transmitted by chain drive from the motor to the car axle.

TOTALLY ENCLOSED FAN-COOLED MOTORS

A new series of totally enclosed fan-cooled industrial A.C. motors, which develop up to twice the power of previous totally enclosed motors of equivalent frame size, are announced by Crompton Parkinson, Ltd., Crompton House, Aldwych, London, W.C.2. Designated Series T.E.F.C., they are, rating for rating, substantially smaller and lighter and on average 9½ per cent lower in cost than the motors they supersede. Electrically, they conform to B.S. 2613:1957 Class E insulation, and dimensionally to a new B.S. draft specification, and their fixing dimensions are the same as Series 5 ventilated motors to B.S. 2960:1958. All the motors can now be supplied with fixing dimensions to the American N.E.M.A. specification, and are therefore interchangeable with American machines of the same power. The fixing dimensions are also in accordance with the latest recommendations of



One of the Crompton Parkinson Series T.E.F.C. totally enclosed, fan-cooled industrial A.C. electric motors

the International Electrotechnical Commission.

Cooling is by an entirely new design of fan that promotes a very high velocity stream of air which smoke tests show remains in intimate contact with the motor carcase over its whole length. Rapid transfer of heat from the centre to the outside is promoted by, among other factors, an interference fit of the stator stamping packs in the housings. With the smaller motors in the range it has been possible to dispense with the usual longitudinal fins on the outside. The standard motor is suitable for the majority of normal applications, but by variations of rotor design it is possible to provide different starting characteristics to suit special requirements of driven machines, such as high torque involving a large amount of static friction and high slip rotors for fly-wheel drive applications.

The new motors are now available in ratings from 1 to 7½ h.p. at 1,400 r.p.m., and, shortly, the remainder of the range, from 10 to 40 h.p. at 1,400 r.p.m.

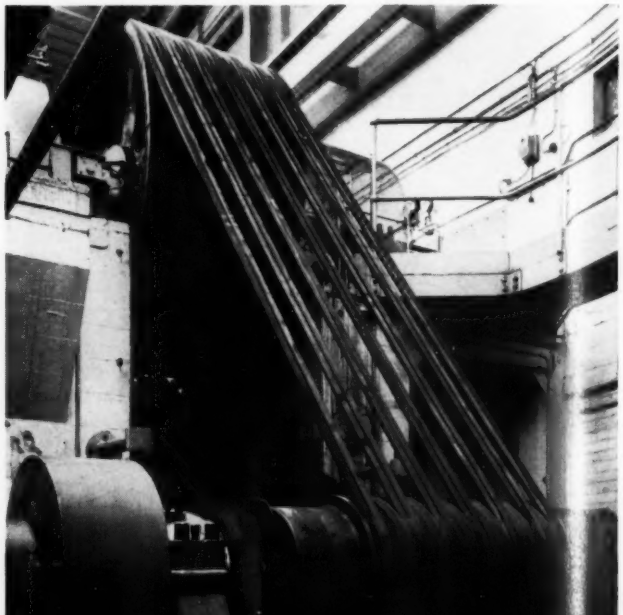
TERYLENE REINFORCED V-BELTS

Though between 30 and 40 per cent more expensive than standard driving V-belts of the same size, the extra cost of Terylene reinforced V-belts is said to be more than justified by the advantages they afford. They stretch far less, have better dimensional stability, anti-static properties and resist heat, oil and shock loading. Because of their greater strength, it has often been possible to use fewer on existing drives so that for future designs of drives they offer considerable saving in space as well as cost. They are being used for from ½-h.p. machines up to 600-h.p. compressors.

It is stated that the Glacier Metal Co., Ltd., have changed to Terylene V-belts on bearing test rigs with pulley speeds up to 6,000 r.p.m. and oil vapour temperatures of 180 deg F, and it was found that they lasted three times as long as standard belts, and have now been installed on all 21 test heads. They have also been tested

(*Continued on page* 237)

Terylene-reinforced premium V-belts installed on a 600-h.p. compressor at a chemical works in north-east England

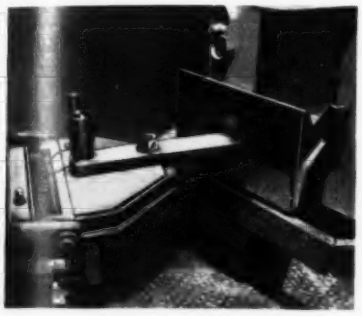


at the Bonnybridge generating station, Falkirk, on coal-handling plants carrying a maximum of 60 tons of coal an hour. Three Terylene belts have lasted twice as long as seven standard belts did previously, and in 19 months have needed no adjustments.

Manufacturers are Imperial Chemical Industries, Ltd., Imperial Chemical House, Millbank, London, S.W.1.

AUTOMATIC TRAILER COUPLING

Time lost while the driver of a prime mover gets out of his cab, hitches or unhitches his trailers and then remounts before driving off can be avoided by the use of the autolink automatic coupling introduced by W. C. Youngman, Ltd., Manor Royal, Crawley, Sussex. It is fitted on to the rear of the prime mover and consists of a flared opening which houses two spring-loaded pawls of special shape. The trailer drawbar eye is guided into this and thrusts



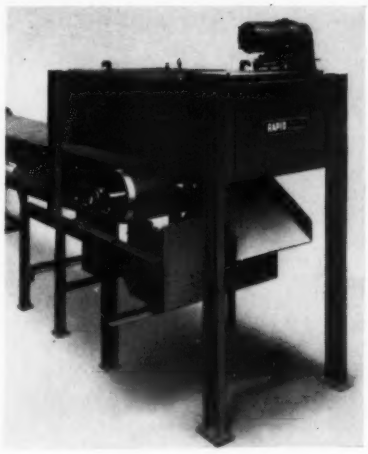
Showing the flared housing of the Youngman Autolink automatic trailer coupling and spring attachment to keep the trailer drawbar horizontal and allow pivoting movement over uneven ground

the pawls apart which then spring together and lock it in position. The pawls can be released by moving in the cab a lever attached to a flexible cable. The whole of the mechanism is enclosed in a heavy cover, and it is all robustly constructed to resist shock loading.

The coupling can be fitted to any make of tractor and allows the driver to remain in his cab all the time, hitching and unhitching, without needing a second man to guide him into position. This is of considerable advantage to every industrialist faced with continuous or frequent internal transportation involving trailers and prime movers, and quickly recovers the cost of the coupling and spring-controlled drawbar attachment supplied to keep the drawbar horizontal while allowing it to pivot when travelling over uneven ground.

MAGNETIC SEPARATOR FOR FINE-MESH MATERIALS

A new magnetic separator is announced by Rapid Magnetic Machines, Ltd., Lombard Street, Birmingham, 12. Known as the APS, it is designed specifically to handle high throughputs of fine-mesh materials containing a high percentage of magnetics and demanding severe agitation after pick-up in order to ensure a clean, high-grade magnetic fraction. Typical applications are the recovery of magnetic



Typical installation of a Rapid APO overband magnetic separator over a feed conveyor

materials from crushed ore, separation of steel shot from scale and recovery of iron from crushing fines in slag processing plants. Throughputs of up to 30 tons/hr are possible on an 18 in wide machine.

The Rapid alternate-pole magnetic separator consists of a self-discharging electro or permanent polarity magnet unit suspended at the terminal end of a short centred conveyor. A hopper with jig shaker feeder is provided, and dividers are incorporated at the point of discharge for collection of high-grade non-magnetic fraction and middling product if required. Where feed conveyors are already available, the overband magnetic unit, designated APO, can be offered separately.

PALLET LOADING MACHINES

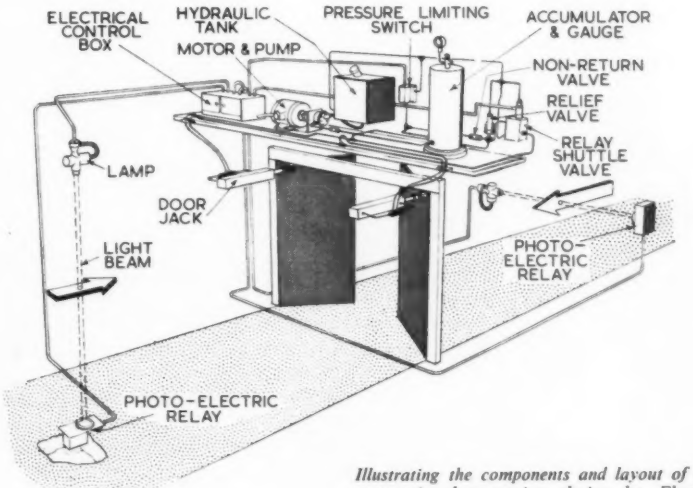
For speeding up production time and reducing costs and manual labour, Gimson & Co. (Leicester), Ltd., Vulcan Road, Leicester, have introduced a new pallet-loading machine. Originally designed for moving and stacking bottle crates, it has now been adapted for stacking boxes, crates and cartons.

Two machines have been designed. One stacks 30 standard one-dozen 26-oz size cases in five layers of six cases per layer, and turns the pallet through 90 deg after each layer is stacked to interlock the load. Cases are fed to the loader by a gravity roller conveyor arranged to suit individual requirements, and a timing device permits only three cases to pass forward at a time. They are then lifted and moved on to the pallet which is housed on a revolving turret. The second delivery of three cases is similarly transferred to the pallet, and simultaneously a timing device operates, moving the turret with the partly loaded pallet on it through 90 deg. On the original model the pallets were placed by hand upon the turret and the full pallets were removed by fork or pallet truck to storage, but the makers state that developments are well under way to arrange for the automatic feed and discharge of the pallets.

The second model has no turret, this being unnecessary with interlocking crates which require no bonding. It is easy to install, though a suitable supply of compressed air is required. If necessary, the machine can be supplied with a built-in motor-driven air compressor. The new loaders will handle approximately 1,000 20-bottle crates, cases or cartons per hour. (*For illustration see MECHANICAL HANDLING March issue page 172.*)

AUTOMATIC DOOR-OPENING DEVICE

The delay and inconvenience experienced when pushing a trolley through a swing door are avoided if it opens automatically as it is approached. Automatic door-openings systems have been supplied to various users by Electro-Hydraulics, Ltd., Liverpool Road, Warrington, and their success has prompted the company to offer the equipment to a much wider section of the community. Operation of the system depends upon the installation of a light beam at a suitable distance from the doorway, usually 10-15 ft away. This is broken by the approach of a person or vehicle, an electrically operated valve is thus energised, hydraulic cylinders are

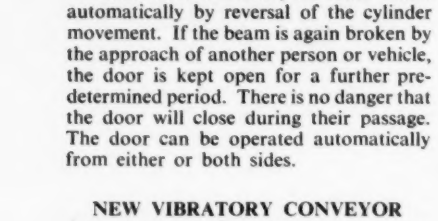


Illustrating the components and layout of the automatic door-opening device by Electro-Hydraulics, Ltd.

actuated and the door is opened. After a suitable delay, which can be adjusted according to speed of traffic and distance of beam from the door, the door closes automatically by reversal of the cylinder movement. If the beam is again broken by the approach of another person or vehicle, the door is kept open for a further predetermined period. There is no danger that the door will close during their passage. The door can be operated automatically from either or both sides.

NEW VIBRATORY CONVEYOR

A new type of vibratory conveyor, considerably cheaper than the conventional magnetic design, has been developed by the Sinex Engineering Co., Ltd., North Feltham Trading Estate, Feltham, Middlesex. Known as the Sinex, it has all the advantages of the magnetic conveyor (except that it has a fixed rate of feed), i.e. few moving parts, low maintenance



The new Sinex vibratory conveyor

requirements and silent operation. It is particularly adaptable where very little headroom is available. Applications for which it is specially suited are those involving the simple transfer of material from one point to another; the feed can be stopped or started at will, and although the speed of travel remains constant, the level of material can be altered by means of a gate to control the amount being fed. The length is adapted to requirements.

The conveyor comprises a feed trough fitted with a pair of the new standard SV range of Sinex electric conveyors, one on each side. The vibrators are mounted with their shafts in a vertical plane, but inclined at a specific angle to provide a feed of material in one direction along the trough. Each conveyor can be supplied complete with base structure or with simple mountings for attachment to the customers' own equipment. The only moving parts are the rotors of the vibrators. Vibrators can be quickly replaced, if eventually necessary, by virtue of their 4-bolt lug mountings.

ELECTRIC INDUSTRIAL PERSONNEL CARRIER

For the speedy conveyance of visiting or other personnel over works or other industrial areas Wessex Industries (Poole), Ltd., West Street, Poole, Dorset, have added a compact four-seater carrier to their range of industrial aids. It is powered by a 24-V C.A.V. electric traction motor, driving through duplex chain reduction in a totally enclosed steel plate housing mounted inboard of the nearside rear wheel. It has a pedal-operated 5-step controller with resistance and forward-reverse switch in a separate compartment in front of the driver, Girling 6 in rear wheel brakes with hand parking lever and steel wheels with 16 × 4 in pneumatic tyres. Full-lock Ackerman steering on front axle gives a 16 ft turning circle between kerbs and 17 ft 3 in between walls. The 24-V 100-amp hr Exide Ironclad battery under the front seat gives a range of about 18 miles, and a Westinghouse VZ.12/10 charger with time control relay is supplied. The overall length is 6 ft 3 in and width 3 ft 9 in, and the weight 850 lb, including battery. The two-bench seating is of fabric, covered over foam rubber. When loaded, the vehicle can travel at speeds up to about 15 m.p.h. over level surfaces.

SELF-PRIMING PUMP

The Pep-Loewe range of centrifugal pumps has been increased by the addition of a new vertical self-priming unit, the VRL.225. Produced by Precision Electrical Products (Stockport), Ltd., Progress Works, Lytham Street, Cale Green, Stockport, it is robustly designed for general-purpose pumping duties and is suitable for handling clear or cloudy liquids up to 220 deg F, fuel and diesel and other oils up to 450 sec Redwood No. 1. Due to its self-priming characteristics, it can be used to handle volatile liquids. It primes quickly, the dynamic suction lift amounting to as much as 28 ft when pumping cold liquids. The

The Pep-Loewe VRL.225 vertical self-priming pump

capacities and heads available are 7[illegible] g.p.h. at 100 ft of liquid and 400 g.p.h. at 25 ft.

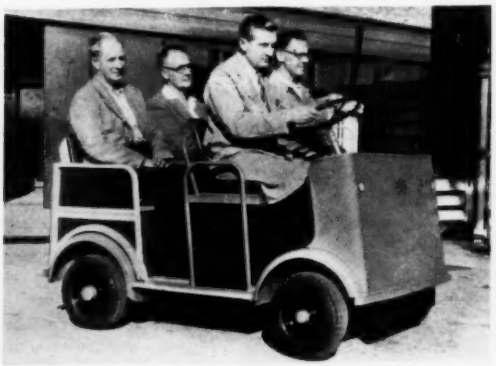
Occupying less than 1 sq. [illegible], the VRL.225 incorporates several new features. The casing is designed so that if the foot valve on the suction line should be inoperative, the pump will continue to work. The specially shaped impeller is fitted with very short blades to prevent breakage on bending, and is also fixed so that it is not in contact at any point with the casing and thus suffers no wear. The pump and motor shafts cannot become misaligned since they are rigidly coupled by a new type of special split coupling. The new pump is normally driven by a 1-h.p. 3-phase motor, but if required either a single-phase A.C. or D.C. motor can be fitted.

NEW MERTON FRONTLOADER

The Merton Frontloader 59, first introduced last June by Merton Engineering Co., Ltd., Faggs Road, Feltham, Middlesex, is now available with torque converter power-shift transmission. The unit fitted is the well-tried Brockhouse hydraulic shift single-stage torque converter, which gives two forward and one reverse speeds of up to 5 and 10½ m.p.h. and 5½ m.p.h. respectively. The machine is powered by the latest type Fordson 4-cylinder 62 h.p. diesel engine, is robustly constructed with excellent outreach for loading high-sided lorries or plant hoppers and has been specially designed to give the driver the maximum view of his work. The front-mounted cab has all-round visibility and at all times the driver can see the digging edge of the bucket.

Feeding the hopper of a tarmac plant with the new Merton Frontloader 59 (Right)

The new Wessex 4-seater electric industrial personnel carrier



TRADE NOTES

New Overhead Cranes for Locomotive Works

Two 60-year-old electric overhead cranes in the diesel shop at Doncaster Locomotive Works are being replaced by the Eastern Region of British Railways. The two 30-ton travelling cranes at present in use are belt-driven and in order to deal more efficiently with the larger diesel and diesel-electric locomotives now coming into use each of the two new cranes will have a capacity of 45 tons. The new equipment will ensure an adequate safety margin when dealing with the heaviest lifts.

The new 4-motor cranes, both of which have a 45-ft 6-in span, are being supplied and installed for the Chief Mechanical and Electrical Engineer, Eastern Region, by Messrs. Herbert Morris of Loughborough. They are expected to be in service by the end of 1960.

The necessary strengthening of the crane gantries will be undertaken by the Chief Civil Engineer, Eastern Region.

New Field Office

Square D., Ltd., announce the opening of an additional Field Office located at Lloyds Bank Chambers, Wellington Street, Horley, Leeds (telephone no.: Horley 369), under the management of Mr. P. Wyer.

A giant crane for the Port of Luebeck. Demag A. G. Duisburg (West Germany) are building at present a giant crane for the Port of Luebeck. The crane will have a height of 35 m (104·9 ft), load capacity of 6-10 ton at jib length of 23, 15, 8 m (75·5, 50·2, 26·2 ft). The crane will be delivered in the middle of 1960

Hough payloaders are to be made shortly by International Harvester at their Doncaster works

Hough Payloaders

International Harvester are to commence manufacture at the Doncaster Works shortly of Hough Payloaders, a line of product entirely new to their current British production. This was announced to-day by Mr. O. G. Voss, managing director of International Harvester Co. of Great Britain, Ltd.

The Payloader is a product of the Frank G. Hough Co. (say 'Huff') of Libertyville, Illinois, a wholly owned subsidiary of the International Harvester Co. of Chicago. The Hough Payloader has long been in world-wide demand. The reception of this announcement at a Harrogate preview recently by over 100 representatives of overseas distributors was enthusiastic and augurs well for export sales.

Mr. Voss stated, 'We are entering this additional field because of a strong demand from our home and overseas customers for further diversification of our production. We know we shall be able to produce at a competitive price and are confident of increasing our sales volume substantially as a result. The first unit to go into production will be the H-70. The new Hough line of rubber-tyred shovels will give our domestic and export distributors a broader range of British products'.

Coal Preparation Plants in South Africa

The British General Electric Co. (Pty.), Ltd., Johannesburg, which represents The General Electric Co., Ltd., of England in South Africa, has received contracts for two coal preparation plants worth approximately £230,000 to the company.

The Chance sand flotation process will be employed in both installations and the plant will be supplied by G.E.C. The primary screening and conveying sections of the plant will be provided by Robins Conveyors (S.A.), Ltd., with whom the G.E.C. has close relations in this class of work.

The first plant will be situated at the Landau Colliery of the South African Coal Estates (Witbank), Ltd., and will clean 6 in × ¼ in raw coal at the rate of 350 short ton/hr. The second, for Natal Navigation Collieries and Estate Co., Ltd., will be built at their Kilbarchan Colliery and will handle 6 in × ¾-in coal at the rate of 320 short tons/hr. The clean coal from the latter plant will be employed entirely for steam raising in power stations, but the Landau plant will produce upgraded sized coal for the domestic market.

Most of the equipment associated with the Chance cleaning sections will be manufactured in South Africa to the designs of the Erith Engineering Works of G.E.C. but some will be made at Erith. The British General Electric Co. (Pty.), Ltd., will be responsible for the co-ordination of the work with Robins Conveyors (S.A.), Ltd., and for the building and civil engineering work associated with the cleaning sections of both plants.

£2m Contract for G.E.C.

A further contract valued at £2m for power plant and electrical equipment has been placed with The General Electric Co., Ltd., by Colvilles, Ltd. The plant and equipment is for extensions to the power house at Colvilles' Ravenscraig Iron and Steel Works, near Motherwell.

Included in the contract are two turbo-generators, one of 20 mW, 30 mVA, and one of 12 mW, 28 mVA capacity; a turbo-

Neat, sturdy and weatherproof, the cab of this Coventry Climax fork lift truck, built by Bonallack & Sons, Ltd., of Basildon, for Shell Refinery Co., Ltd., is constructed of light aluminium alloy with windows of toughened glass. The doors of the cab can be removed completely for summer operations

Mr. Billy Butlin sitting on the new Massey-Ferguson 35 tractor which he has bought for site work on his Bognor Regis holiday camp site where this picture was taken. The tractor—which was supplied by Mr. W. H. Diplock (right), managing director of Walter A. Wood (Sales), Ltd., Massey-Ferguson distributors of Horsham—is fitted with the Massey-Ferguson 1-ton fork lift

blower rated 90,000 c.f.m., 40 lb/sq. in.; a 200,000-lb/hr gas-fired boiler; feed heaters, condensers and ancillary plant; and all the motors, switchgear, transformers and cabling for auxiliary services. Also being supplied are two 30-mVA, 33/11-kV transformers and the necessary 33-kV and 11-kV switchgear.

G.E.C. is acting as main contractor for the whole of the power house extension including civil works and auxiliary services.

Plant Mobility between Building Sites

Fluctuating demands for earth-moving plant on building sites are a constant worry to plant managers. Rush & Tompkins, Ltd., have solved this problem by employing a Michigan 85A as a multi-purpose machine, to work between various sites in the London area.

The Michigan's 27-m.p.h. road travel speed makes this economical. It reduces delays to a minimum and avoids altogether transport charges. Twice each week the machine moves between two London County Council housing estates at Sydenham Hill and Wandsworth. The eight-mile journey takes 30 minutes and the Michigan arrives on site immediately ready for work. Mainly used for clearing and levelling, the 85A is also employed loading out lorries with rubble, carrying and stacking, or towing. The tractor's manœuvrability shows up to advantage in the congested area of the building site. The high flotation rubber tyres cause no damage to drains, curbstones or manhole covers, and the ground is left clean and well compacted. It has proved to be the all-round handling tool for building site operations.

Bowmaker, Ltd.

The above organization which, as readers will know, offers credit facilities for all branches of commerce and industry, has recently opened two new offices. They are Bowmaker House, William Street, Cardigan. Tel.: Cardigan 2688. Resident Representative: Mr. P. H. Evans; and Kershaw House, Great West Road, Hounslow. Tel.: Hounslow 2212/4. Resident Representative: Mr. M. Spring-Rice.

Delivery by Crane—
Rhenus Installed at George Berridge

Being prepared to do the unusual is as necessary to a printer's supplier as to the printer himself. If it means bringing up a crane, stopping the traffic, delivering crates through a second-floor window on a Saturday morning to get a machine installed, then this must be done.

This was the situation that faced Soldans, Ltd., when they put in a Johannesberg Rhenus 25-in × 38-in stop cylinder machine at the Steward Street premises of George Berridge & Co., Ltd.

Steward Street is narrow and busy, and runs into Spitalfields Market. The building is tall, with the mains goods lift placed centrally, ideal for working use, of course, but of limited help only when machinery is to be installed. This meant, therefore, a Saturday morning delivery, through a second-floor window, the use of a 20-ton crane with a 50-ft jib to ensure that there was ample capacity to hoist the heaviest crate to the proper height, and a scaffold platform on which to handle the heaviest loads.

As soon as trading in Spitalfields Market ceased on Saturday, February 13th, Steward Street was closed to traffic to allow Beck & Pollitzer to move their crane equipment into position. The police had provided an ample supply of no-parking signs to keep the way clear, and the crane equipment was soon levelled, and the jib assembled.

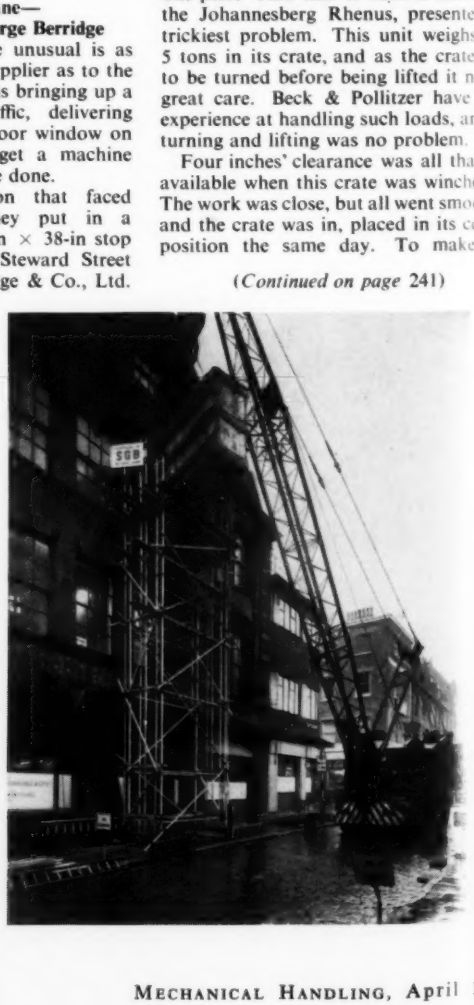
From the docks came the heavy lorry with the three main crates holding the major components of the machine, for this machine was built in Germany and imported. Other crates that contain the remainder of the equipment are smaller, easy enough to handle on the ordinary lift.

Scaffolding was already in position for the operation, and the two smaller crates were easily raised and landed, and winched into the main machine room. The heaviest crate, containing the solid one-piece base that is such a feature of the Johannesberg Rhenus, presented the trickiest problem. This unit weighs over 5 tons in its crate, and as the crates had to be turned before being lifted it needed great care. Beck & Pollitzer have great experience at handling such loads, and the turning and lifting was no problem.

Four inches' clearance was all that was available when this crate was winched in. The work was close, but all went smoothly, and the crate was in, placed in its correct position the same day. To make this

(*Continued on page* 241)

Crate which weighs over 5 tons being lifted on to the platform in the works of George Berridge & Co., Ltd. (Right)



A Michigan 85A loading away rubble on a London County Council building site (Below)

Mobile crane on Thames Trader. Developed by Tunny Cranes, Ltd., of London, this hydraulically operated 2-ton crane is mounted on a Thames Trader 4-ton chassis which is specially shortened from 138 in w.b. to 108 in w.b. and powered by the Ford-made 4-cylinder diesel engine. By shortening the wheelbase of the truck it is possible for the crane to pick up loads directly in front of the cab as well as at the sides and rear. All controls for the crane are mounted inside the cab above and to the rear of the passenger seat. A special extension has been mounted on the roof of the cab so that the operator can stand comfortably while operating

achievement possible, there was close co-operation between the four firms concerned, George Berridge, Ltd., Soldans, Ltd., Beck & Pollitzer, Ltd., and S.G.B., the Mitcham scaffolding firm. The whole operation went without a hitch, and by 12 o'clock the crane and scaffolding were being dismantled.

Skefko Celebrates its Golden Jubilee

Recently the Skefko Ball Bearing Co., Ltd., Luton, celebrated its Golden Jubilee, and this was the occasion for issuing a special Golden Jubilee number of its house magazine, the 'Inner Ring'. This contains a brief history of the company from 1910 to the present day and is profusely illustrated.

The Mining Engineering Co., Ltd., Celebrate 50th Anniversary

The above company, of Meco Works, Worcester, recently celebrated the 50th anniversary of their formation. A well-produced book has been issued giving the history of the company and photographically showing the increase in size of the firm's factories.

Angel Truck Co., Ltd.

The above company have moved to new premises at 242/244 Billet Road, Walthamstow, London, E.17. Tel.: Larkswood 5566.

Albert Mann Engineering Co., Ltd., Acquire Rolls Race Conveyors, Ltd.

It has recently been announced by Albert Mann Engineering Co., Ltd., Basildon Industrial Estate, Essex, that they have acquired the whole of the share capital of Roll Race Conveyors, Ltd., and with it, the right to manufacture and sell the patented Roll Race principle of conveying. The company will be showing at the Mechanical Handling Exhibition, Earls Court, May 3rd to 13th, 1960.

Timber Importers Buy Collins' Music Hall

Due to expansion of business, C. F. Anderson & Son, Ltd., timber and wallboard importers, have bought Collins' Music Hall.

Established in 1863 they now have branches in Mitcham and Southgate; the head office and timber yard in Essex Road border Collins' Music Hall. A fire, which broke out on September 13th, 1958, causing extensive damage, resulted in the final closing of one of London's oldest music halls.

With the approval of the L.C.C. the newly acquired premises will become a timber store and it is probable that the remainder will be fitted as offices. The fact that the hall holds almost 1,000 people is an indication of the size.

Plessey Award Winner Flies to America

Malcolm Church, the 21-year-old ex-apprentice from the Kembrey Street, Swindon, factory of The Plessey Co., Ltd., who was recently selected for a six-month tour of America to study engineering techniques and production methods, left London Airport recently for New York.

Mr. Church, who is a junior jig and tool draughtsman in the Plessey Units and Parts Division, will travel from New York to Indiana where he will study the work of the Cummins Engine Company of Columbus and visit many of their sub-contractors. Before leaving England, Mr. Church spent a short time in the Shotts, Lanarkshire, factory of the Cummins Engine Co. where diesel engines for road-making vehicles and tractors are made and for which Plessey supply hydraulic equipment.

£300,000 Crane Order

Wharton Crane & Hoist Co., Ltd., of Reddish, Stockport, have secured an order worth over £300,000 for overhead electric travelling cranes to be supplied to Richard Thomas & Baldwin's giant new steel rolling mill at Llanwern, near Newport.

The cranes are of various types, with capacities in the 10-ton to 75-ton range. Deliveries will commence in September this year, continuing until April, 1961.

Thanks chiefly to good orders on hand for Britain and overseas, Whartons have managed to ride the recent recession in the crane industry.

'We are now in an even stronger position', says Mr. Harold Smith, chairman and managing director. 'This particular order is one of a number we have had since the turn of the year and there is every indication of better days ahead. With the general improvement we can anticipate more overtime and an increase in the number of people we employ'.

Big Cranes Have Little Cranes

The 'little' crane in this instance weighs 140 tons. It is a 10-ton capacity Babcock level-luffing portal-type grabbing crane, and the photograph shows it being transported up river from the West India Docks by the Port of London Authority's Mammoth floating crane to the jetty alongside the Greenwich power station of the London Transport Executive, where it will be used for unloading coal supplies from sea-going barges.

Space limitations at the final site on the jetty made it necessary to pre-erect the crane elsewhere for subsequent transportation across the river as a complete unit.

10-ton Babcock level-luffing portal-type grabbing crane en-route for Greenwich

PUBLICATIONS RECEIVED

B. & F. Carter & Co., Ltd.
Two comprehensive leaflets, P1 and P2 respectively, entitled 'Ribble' Centrifugal Clutches and 'Ribble' Infinitely Variable Speed Unit, have recently been issued by the above company of Albion Works, Bolton.

Mackay of Feltham
The above company, of Central Way, Feltham, Middlesex, have recently produced two new brochures. These feature the Allis-Chalmers HD.21 and HD.16 crawler tractors. Copies may be obtained from the above address or from their depot at Wheatley Hall Road, Doncaster.

Teleflex International News
The first edition of the above publication has recently been issued by Teleflex Products, Ltd., Basildon, Essex, giving details of the Company's developments and service at home and abroad.

World of Meaning
A lavishly illustrated brochure of 97 pages has been published by S. Smith & Sons (England), Ltd., of Cricklewood, London, N.W.2. This surveys their extremely wide range of equipment and describes many new and interesting developments.

Turner Brothers Asbestos Co., Ltd.
A new publication, recently issued by the above company, is the Turner V-belt catalogue. It is extremely comprehensive and deals not only with drive design calculations and horse power capacities, but also with pulley sizes, installation and V-belt maintenance. Copies are available from Turner Brothers Asbestos Co., Ltd., P.O. Box No. 40, Rochdale, or any of their Branch Offices.

European Technical Digests
The Organization for European Economic Co-operation, 3 rue André-Pascal, Paris 16, France, have recently published the December, 1959, number of the above monthly. These digests, of the latest technical developments in Europe, will be of interest to many readers. Yearly subscription is £3 10s. 0d.; Six-monthly subscription £1 15s. 0d.

Batching Plant
Thos. W. Ward, Ltd., Albion Works, Sheffield, have produced a new brochure, entitled as above, illustrating the activities of their Materials Handling Division.

Lancashire Dynamo & Crypto, Ltd.
The above company, of Trafford Park, Manchester, 17, have recently issued a new leaflet entitled 'Motors for Cranes, Hoists and Lifts.'

George Angus & Co., Ltd.
This company, of Angus House, 152-158 Westgate Road, Newcastle upon Tyne, 1, have produced a new leaflet describing their range of industrial safety helmets. They are made of either plastic or glass fibre, combining lightness of weight with great strength of construction, their design allowing for a special margin of safety in the clearance between the top of the head and the helmet shell.

Link-Belt Company
A comprehensive book devoted to the versatile applications and selection of screw conveyors, screw feeders and components has just been released by the above company. This 76-page book, 2989, illustrates over 20 different types of screws, 14 types of troughs, with 4 types of covers, 5 types of discharge openings and 2 types of feeders. Free copies may be obtained from this company at Dept. P.R., Prudential Plaza, Chicago 1, Illinois, U.S.A.

John Fowler & Co. (Leeds), Ltd.
The above company, of Hunslet, Leeds 10, have published a new brochure describing their range of diesel shunting locomotives.

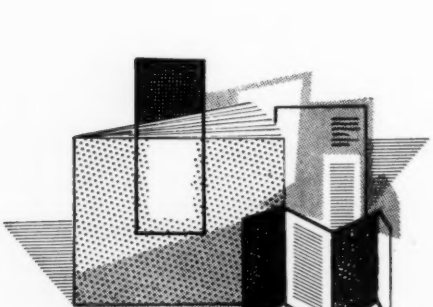
J. W. Roberts, Ltd.
These manufacturers, of Chorley New Road, Horwich, Bolton, have recently issued a leaflet describing 'Limpet' Board, a new product they are in the process of introducing. This describes 'Limpet' Board as a compressed material with a high asbestos content. It is incombustible and conforms to the requirements of B.S.S. 476/53 'Fire Tests on building materials and structures,' (Part 1) Class 1.

Hydraulic Coupling and Drives
Crofts (Engineers), Ltd., of Bradford 3, have issued a new leaflet, entitled as above, Publication No. 5951, 3rd edition 1960.

Charles Pitt (Barton Stacey), Ltd.
A new brochure of Pitt trailers, Publication No. 09459, has recently been produced by the above firm, of Barton Stacey, Hants.

Claude Lyons, Ltd.
The above company, of Valley Works, Ware Road, Hoddesdon, Herts., have published a leaflet describing their new Type PV-250-B Variable Power Supply. Leaflet No. 6002/1.

Civil Engineering
Hansom Books, Ltd., of 21 Lower Belgrave Street, London, S.W.1., the publishers of Technical Books-in-Print, have recently issued a booklet entitled as above. This publication is given free by most good booksellers on request or may be obtained from the above address price 8d.



ABSTRACTS AND REFERENCES

Articles on mechanical handling published in all technical and industrial journals of the world are indexed and abstracted below. Whenever it is known, the published price of the journal containing the article is given.

The addresses of the publications concerned are given and applications for copies of the journals mentioned should be made direct.

PREVENTING CONVEYOR AND ELEVATOR REVERSALS
Two New Holdbacks, *Modern Power and Engineering*, 481 University Avenue, Toronto 2, Canada. December, 1959. P. 81. 50c.

Two types of holdback to protect personnel and equipment from dangerous reversal of conveyors and elevators are briefly described. The standard roller type operates on the roller wedge principle so that, when power is interrupted, or when a loaded belt makes the slightest move backward, the roller wedge between the drum and wedge plate prevents reversal quickly and without appreciable shock. A totally enclosed type has a cast steel housing, hardened wedge block and hardened steel rollers. If power fails and the shaft tends to reverse, the steel rollers engage instantly and arrest the movement. It releases freely and quickly when forward travel is resumed.

LARGE-CAPACITY SCRAPER
Ease of Handling Claimed for 30-yd. Pan. *Engineering News-Record*, 330 W. 42nd Street, New York, N.Y., U.S.A. January 1960. P. 56. 50c.

The Allis-Chalmers TS360 all-hydraulic motor scraper, with a heaped capacity of 30 cu. yd. and struck capacity of 22·3 cu. yd., is said to be fast, efficient and easy to handle. It is powered by a turbo-charged diesel engine, developing 340 h.p. at 2,000 r.p.m. An air-actuated inertia

brake on the countershaft makes it possible to shift from low to higher speeds without double declutching. A tandem pump, gear driven from the engine crankshaft, provides the hydraulic pressures for steering and bowl operation. Double-acting bowl lift jacks apply a positive downward force on the bowl to ensure efficient cutting and loading of heavy material. Ejection of the material is forced by twin telescopic hydraulic cylinders with rams pushing from the centre of the ejector. Double-acting jacks and multiplier links permit a 90-deg turn on a one-sixth turn of the steering wheel. The turning radius is under 18 ft. Two levers control scraping operations.

AIR HOISTS IN INDUSTRY
Hoists Make Light of Work. By G. E. Court, *The Times Review of Industry* 1960. Printing House Square, London, E.C.4. January, 1960. Pp. 22 and 25. 1s.

In common with various other types of pneumatic equipment, the use of air hoists in industry has, the author points out, increased rapidly during the past few years. Among applications where their advantages are obvious are the handling of explosives or wherever there is fire risk. Due to their simplicity and the self-purging effect of compressed air, they will stand up to working under hot, corrosive or steamy conditions, and are suitable for installations in positions exposed to the weather, and outside shipyards, oil refineries and other coastal locations where the effects of salt-laden atmosphere are notorious. They are becoming more and more popular for general lifting purposes, and the avoidance of electric supply cables and low maintenance costs make them an attractive proposition for general factory duties.

The author discusses the comparative suitability of using wire rope or a welded or roller link chain for lifting under different conditions, and the main features of piston- and vane-type motors used. He concludes with practical advice upon the best use of air hoists for various applications and the precautions to be taken in the interests of safety and efficient operation.

FOR TRUCK LOADING AND UNLOADING
Hydraulic Ramps, *Design Engineering*, 481 University Avenue, Toronto 2, Canada. January, 1960. P. 72. $1.

A new series of universally adjustable loading and unloading ramps are said to eliminate time wasted in manœuvring large vehicles into alignment with the loading dock. The most versatile model has vertical, horizontal and lateral movements operated by hydraulic cylinders under push-button control. When a truck comes to the loading dock, the ramp is first raised vertically, aligned laterally and then extended horizontally to overlap the tailboard of the vehicle. Even if the truck is at an angle to the dock, independently moving fingers compensate for the difference. Once in position the floating ramp automatically adjusts itself to changes in the truck's attitude due to depression or expansion of the springs.

INCREASING TRACTOR EFFICIENCY
Transmission Combines Direct and Torque Converter Drive, *Engineering and Mining Journal*, 330 W. 42nd Street, New York, N.Y., U.S.A. December, 1959. P. 45. $1.

Advantage of the versatility of planetary gear is said to have been taken by the Caterpillar Tractor Co., for their D8 and D9 tractors. It is now available for these machines in the form of a combination power transmission train that sends one-third of the power through the transmission input shaft and the remaining two-thirds through a torque converter. The company state that the method provides a greater overall efficiency than a standard torque converter, and yet retains the solid feel of a direct drive arrangement. Power in the D8 and D9 machines has been boosted to 235 h.p. and 335 h.p. respectively. A single range selector lever on the operator's deck takes the place of a clutch lever, gear selector and forward-reverse lever, providing more effortless shifting.

CONCRETE PIPE LIFTER
How to Handle Heavy Pipe, *Coal Age*. Third and Hunting Park Avenue, Philadelphia 40 Pa., U.S.A. December, 1959. P. 158. $1.

At the suggestion of a truck driver it is stated that the Alabama Power Co., Gorgas, Ala., U.S.A., now uses a special device for handling sections of heavy large-diameter concrete pipe. It enables two men to do as much work as four or five did previously. It takes the form of a U-shaped member that is slipped over the edge of a pipe section so that it can be pulled up by a power winch on a truck. One leg of the U is 37 in long and the other 30 in. Both are made of 2¼ in × 4-in 'I' beams welded to an 8-in beam. The longer leg, which is placed inside the pipe, has a piece of ¾ in 2 in × 6-in steel welded to the end to prevent the pipe from slipping as it is raised, and the shorter leg has five different holes providing a selection of lifting points.

RECENT PATENTS

LINK CHAINS
Teleflex Products, Ltd.—U.K. 766476 (reissued amended).

Link chain conveyor with guide rollers, made from stepped design, with sheet or solid metal.

SHEET FEED
International Computers & Tabulators, Ltd.—U.K. 817675 (issued late).

Improved rigid conveyor for feeding sheets, which can be rubber coated and chain driven. Patents 751931, 929892.

SHIPPING PALLET
Wheeling Steel Corporation, of West Virginia—U.K. 817690.

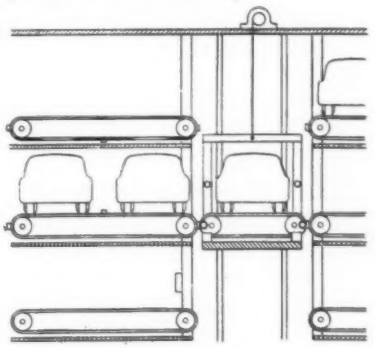
Made from drawn sheet steel with the bottom held to top by wires. Patent 807571 is mentioned.

TRANSPORTER RAIL
C. T. Allen, of Otago—U.K. 817733/4.

Issued very late—for use in metal works, sheep carcase freezing factories, etc., with store conveyance on the rail, using sorting switches with three grade rails and a vertical pivot. The supports on elevator rails use chain drive with pusher arms to propel the slung loads.

CAR STORAGE
C. M. Crawley, of Weymouth—U.K. 817842.

Equipment with two coupled rotors having arms holding cars—using a drive chain system, and worms, holding the car platforms horizontal always.



RECENT PATENTS—*continued*

DISH WASHING
Vict. Th. Engwale & Co., of Sweden—U.K. 817849.

Roller conveyor for handling crockery baskets in small space—with parallel moving lines and rotary turntable transfer.

EXCAVATOR PARTS
Etablissements Matenin, of Paris—U.K. 817858—(issued late).

Trailer at working site allows exchanging parts for bucket excavators, by sliding.

HYDRAULIC TIPPER
Tatra Naroidni Podnik, of Czechoslovakia—U.K. 817859 (issued late).

A tipper lift with automatic securing of the loading bridge to avoid wear and vibration, allowing operation at high speed, securely.

SAMPLER
Central Electricity Generating Board—U.K. 817930.

Scraper with flap which moves across coal conveyor to push off sample, being cam and motor driven.

BAG STACKING
M. L. Van de Gent, of Belgium—U.K. 817949 (issued late).

Two conveyors used pressing together to move bags folded and flat, under a receiver lid for stacking into boxes.

POWER TRUCK
Yale & Towne Manufacturing Co., of New York—U.K. 817979.

Uses a slewing unit, of given form, pivoted vertical without friction bearings.

OIL EXTRACTION
J. Van der Meulten G.m.b.H., of Hamburg—U.K. 818045.

Benzine oil extraction technique for treating rice bran for use in foods to give a better keeping quality bran, using bucket and screw conveyor arrangements.

FIBRE PULP HANDLING
Aktieselskabet Brodrene Hartmann, of Lyngby, Denmark—U.K. 818107 67.

Transfer and conveyor machinery for handling newly formed, wet, fibre pulp products during manufacture and drying without damage, using rotating suction head carriers and transfer mechanisms, throwing off on to a conveyor using chain driven flat trays set, adjustable just below, so as to accommodate various heights of product. For accurate control the chain drive is near the throw off point.

GARAGE
A. T. de Saint André, of Montreaux—U.K. 818150.

Car store with hoist and all parking spaces conveyorized for the wheel parts with arrangements that the lift part can tilt and be set slightly above or below storage levels to aid shifting.

U.K. 818150.

Improvements in garages for parking, automobile vehicles.

NEWSPAPER HANDLING
Les Ateliers de Construction Mecaniques C & A Holwey, Strasbourg—U.K. 818190.

Smaller equipment for folding, cutting and counting printed paper strip such as newspapers, magazines, etc. Conveying and cutting is done at high speed followed by folding and counting, using drum collectors and sets of two pairs of conveyor rollers.

BELT CONVEYOR
K. H. Ohberg, of Bad Neustadt—U.K. 818280.

Loose bulk goods are flung up under centrifugal force, somewhat as per U.S. patent 1226730, away into a collector. A free helix is used, for traverse up, not needing idlers or rail guides giving a cheaper, lighter result than usual, which may be portable.

SAND HANDLER
Keller & Knappich G.m.b.H., of Ausgburg—U.K. 818315.

An improved form of screw conveyor for scattering sand to give uniform feed, even if wet, incorporating a rotating drum, with helical baffle, flap closure and distributor slider.

LIFT TRUCK
Clarke Equipment Co., of Michigan—U.K. 818456.

Uses an extensible upright of low collapsed weight and good height, using a double-acting latch and two moving uprights.

MINE CAGE GUIDES
Coal Industry Patents, Ltd.—U.K. 818587.

Form of removable inset cage guide where the roadway meets shaft, using a given form of lock mechanism and a wedge and bolt form actuated by a pneumatic cylinder.

WINDING DRUM
G. A. Block of Keston—U.K. 818596.

Cage winder drums for mines made from annular rings to take the load, supported by ribs and driven tangentially, to avoid fatigue cracks on the barrel.

PLUCKER
A. G. Budd, of Comb Pluckers, Ltd., of Dorset—U.K. 818599.

Flight and quill feathers removed from poultry in a quieter and simpler manner than usual. A plucking belt and pulley has jockey pulleys to give automatic tension control at the plucking nip.

SAND HANDLING
C. J. Hartley of Stoke—U.K. 818633.

Sanding sludge drying beds are fed with sand and water in pipes, agitated with a travelling screeder plate from a gantry to level the surface.

PLATING HANDLER
H. G. Abbey of New York—U.K. 818649.

A hanging conveyor, e.g. for plating, etc., with easily removed segments for testing and checking components and trolleys if desired, without needing to stop the periodic push action.

TRANSFER MACHINE
Sahlin Engineering Co. Inc., of Michigan—U.K. 818660.

A loading and withdrawing device for pressed steel, etc., sheet metal components, e.g. car bodies, or parts thereof. Patent 669646 is mentioned and the apparatus grips the sheet edge by a swinging arm, which pivots and turns it over before pushing it forward inverted for the next operation.

CIGARETTE HANDLING
K. Korber, of Hamburg—U.K. 818684.

Cigarette lines are turned by a helical conveyor to give a simpler packing arrangement from two parallel lines.

AIRCRAFT HANDLING
J. R. Sharp et alia—U.K. 818752.

A tail or nose wheel lift truck for aircraft, somewhat as per patent 736586, having a chassis with wheels, and a pair of grips comprising pivoted arms, for holding the tyre wheel.

CONCRETE MIXER
Etablissements Richier, of Charleville—U.K. 818880.

A tilting drum mixer design using a simple sturdy form, which avoids pendular motion during tilting, operated by a hydraulic ram.

BREAD CONVEYOR
Baker Perkins, Ltd., of Peterborough—U.K. 818892.

Slicing and wrapping stations fed in tiers from a conveyor so any machines which are inactive can be easily avoided without dislocation. A photo-cell control is used.

PAPER GATHERING
C. W. Didds, of Kansas.

C. W. Didds, of Kansas, in B.P. 818893 suggest a form of paper sheet gathering device to pile them in preset order, using a conveyor fed by vacuum suckers from the sets or piles.

FIBRE EXTRACTION
C. A. Dubois, of Belgium.

C. A. Dubois, of Belgium, in B.P. 811944 outline an endless perforated belt arrangement for rapidly processing jute, flax, etc., by drying and breaking the stem, ungumming them to remove undesired matter from the fibres.

CAR CONVEYOR
A. T. de Saint André, of Montreaux—U.K. 819088.

A car parking conveyor, low, strong and cheap, driven by pairs of chains, including fixation links, with a finger arrangement to give accurate positioning on stoppage.

IDLER ROLLER
Conveying Developments, Ltd., of Cardiff—U.K. 819142.

For use in coal mines, etc., with horizontal centre rolls and side ones movable to cope with varied belt widths, as required.

LIFT TRUCK
K. G. Schutz, of Essen—U.K. 819154.

An improvement for patent 796834 relates a detachable carrier at the rear of a chassis between the wheels, and includes a lift unit for tilting and hydraulic tank, with control near the driver at the front.

COAL CONVEYOR
Colinshaw Walker & Co., Ltd., of Stoke—U.K. 819260.

A gate feeder or stage loader conveyor which rises from a low level and uses a scraper chain, mounted on a twin axle trestles with mine car type track wheels.

TRANSFER DEVICE
Pittsburgh Plate Glass Co., of Pennsylvania—U.K. 819271.

Device for moving sheets of glass from one conveyor to next, when making safety glass, using a reciprocating carriage.

BAKERY CONVEYOR
T. & T. Vicars, Ltd., of Newton le Willows—U.K. 819285.

Bread moved from bakery conveyor to slicer-wrapper machines, via several conveyors, which can feed on to one main line, using power-driven belts which accept only end-oriented loaves, by having a belt width less than that of loaves and hold up device for wrongly oriented ones.